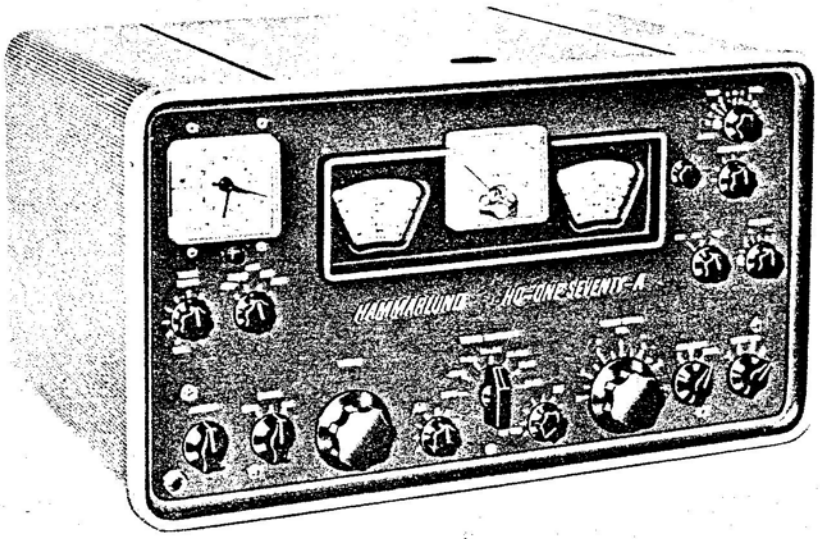
THE HQ-170A COMMUNICATIONS RECEIVER



THE HAMMARLUND HQ-170A
AMATEUR HAM BAND RECEIVER

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Amateur Bands Covered:
6, 10, 15, 20, 40, 80, and 160 meter bands.

Calibration:
Dial markings every 5 KCS on 20, 40, 80, and 160 meter bands; every 10 KCS on 15 meter band; every 20 KCS on 10 meter band; every 50 KCS on 6 meter band. Plus 2 meter calibration scale.

Number of Frequency Conversions:
Dual on 160 and 80 meter bands. Triple on 40, 20, 15, 10, and 6 meter bands.

Frequency Range Covered:
1.8-2.0 Mcs. 3.5-4.0 Mcs. 7.0-7.3 Mcs. 14.0-14.4 Mcs. 21.0-21.6 Mcs. 28.0-30.0 Mcs. 50.0-54.0 Mcs. Converter Scale 144-148 Mcs.

Maximum Audio Output:
1.0 Watt (Undistorted)

Passband Tuning Range:
plus/minus 3 KCS with calibration every 1 KC. 8:1 vernier tuning ratio.

Output impedance:
3.2 Ohms (EIA Standard) plus 500 Ohms.

AVC Action:
Operates on RF and 3 IF stages. Provides fast charge--adjustable discharge smooth acting AVC. Delayed AVC applied to the RF and (1) IF stage. Better than .001 second attack time and .01-.1-1. Second decay time. Off position.

Adjustable Selectivity and Selectable Sidebands:
6db bandwidths Upper sideband--1-2-3 kcs Lower sideband--1-2-3 kcs Both sidebands--.5-2-4-6 kcs

Sensitivity:
An average of 1.5 microvolts produces 10:1 signal-to-noise ratio on AM approximately .7 μv on CW and SSB.

Antenna Input:
100 ohms nominal balanced or unbalanced. Provision for separate 50 ohm coaxial 6 meter antenna. Plus SO239 (UHF) Antenna connector accessory socket.

Antenna Compensator:
Permits compensation for loading effects of various type antennas, or balanced transmission line.

Beat Frequency Oscillator:
Variable from zero beat plus/minus 2 kcs plus fixed position for SSB.

Slot Filter:
Range plus/minus 5 kcs of center frequency. Attenuation over plus/minus 5 kcs range provides over 40 db. Calibrations every 1 kc. Maximum attenuation using slot depth control is 60 db. 8:1 vernier tuning ratio.

Tube Complement:

6BZ6	RF Amplifier
6BE6	1st Converter
6C4	HF Oscillator
6BE6	2nd Mixer-Crystal Osc.
6BA6	455 kc IF Amp.
6BE6	3rd Mixer-Variable Osc.
6BA6	60 kc IF Amp.
6BA6	60 kc IF Amp.
6BV8	60 kc IF Amp. AVC-AM Det.
12AU7	SSB Product Detector
6AL5	Noise Limiter
12AU7	BFO-"S" Meter Amplifier
6AV6	1st AF Amp.-Delayed AVC Clamp
6AQ5	Audio Power Output
OB2	Voltage Regulator
6BZ6	Crystal Calibrator

Semiconductor Complement:
Rectifier -- Two 800 P.I.V. at 1/2 amp.

Power Supply:
105-125 Volts 50-60 cps. a.c. power consumption. 120 watts.

"S" Meter:
Calibrated 1 to 9 in steps approximately 6 db. Also includes db scale, above S-9 to plus 40 db. (Meter deflects on all types of signals.)

Noise Limiter:
Adjustable series type provides both positive and negative clipping.

Front Panel Equipment:
Main Tuning
Vernier or Bandpass Tuning
Sensitivity (RF Gain): on/off switch
Selectivity: 0.5-1-2-3 Kcs. (per sideband)
Sideband: Upper-lower-both
Audio Gain
Antenna Compensator
Tuning Range (Band Selector)
Function Switch: AM-SSB-CW
Slot Freq. Calib. --Slot Depth
CW Tone (BFO Pitch)
Noise Limiter, adjustable -on/off switch
AVC, off-slow-medium-fast
Send-Receive-Calibrate
Phone Jack
"S" Meter
Dial Scale reset

Rear Panel Equipment:
Terminals for speaker connections
3.2 ohm for voice coil
500 ohm for line or VOX

Accessory socket for preamp, Q-multiplier or converter.
System socket for simplified associated transmitter/receiver control.

Phono-type coax fitting 455 KC output for Q-multiplier or other use.

S-meter controls.

Antenna input terminals plus SO239 for HF input and phono-type coax input for 6 meter antenna or converter unit.

Dimensions:
10-1/2" H x 19" W x 13" D
Wt. 38 lbs.
Shipping Wt. 45 lbs.

24 HOUR CLOCK-TIMER

Combination clock and automatic timer. Aids in meeting prearranged schedules. Optional extra.

Starting with the front panel layout, the careful selection of high-reliability components, the craftsmanship of skilled technicians, and the addition of engineering leadership result in a receiver worthy of the Hammarlund name in quality and performance.

The HQ-170-A offers the amateur a practically endless combination of tuning techniques whereby reception of SSB/CW and AM/MCW may be achieved. Through the use of the vernier tuning, adjustable bandwidth, and the basic, precision front-end of the HQ-170-A the user has full control over SSB signals as well as adjacent, or co-channel signals. If there's a signal to be received, the HQ-170-A can ferret it out...

The HQ-170-A is a "hot" receiver. It will provide 10 db signal-to-noise ratio at 1.5 μvolt AM or approximately .5 μvolt CW, or better depending on bandwidth. The front-end provides tuning of the 6, 10, 15, 20, 40, 80 and 160 meter amateur bands. The receiver is designed for use with a single wire flat top, a folded dipole, or doublet antenna. Separate antenna terminals are provided for 6-meter reception, so that a separate 6-meter coaxial antenna may be installed to achieve the ultimate in receiving sensitivity at this frequency.

CIRCUITRY The HQ-170-A is a triple-conversion receiver on the 7 MCS through 54 MCS bands and dual conversion on the 1.8 MCS to 2.0 MCS and 3.5 MCS to 4.0 MCS bands.

Starting at the front-end, the HQ-170-A utilizes a (6BZ6) tuned RF amplifier and a separate mixer (6BE6) and oscillator (6C4) for a high degree of stability. Advanced design and modern tube types account for the very high gain and low noise factor. Refer to page one for complete listing of the many possible functions and the complete tube lineup.

Low-loss, coil forms, and bandswitch wafers, plus temperature-compensating capacitors, and the application of regulated power to the oscillator circuit provide a high degree of stability.

BANDSPREAD Electrical bandspread tuning with direct dial calibration is provided for all seven bands; 160, 80, 40, 20, 15, 10 and 6 meters. Through the use of two dials, optimum bandspread has been achieved by greater dial scale length. A 144 MC scale is also included.

TRIPLE CONVERSION The HQ-170-A offers triple conversion with IF frequencies of 3035 KCS, 455 KCS, and 60 KCS, providing excellent rejection of image-response. The second IF is heterodyned with a crystal-controlled oscillator. The third IF is heterodyned with a high stability, adjustable oscillator which contains micro-accurate vernier tuning control, located on the front panel.

IF AMPLIFIER The 3035 KCS and 455 KCS IF amplifiers provide eight tuned circuits in three stages of amplification. Six tuned circuits in the three-stage 60 KCS amplifier provide either the second or third conversion, depending upon the operating band. All IF circuits employ iron-core permeability-tuned transformers for the high performance and retention of alignment accuracy. The 60 KCS amplifier selectivity is controlled from the front panel by seven positions: 1-2-3 KCS on either sideband, and .5-2-4-6 KCS on both sidebands. The skirt selectivity of this system approaches that of the mechanical filter. A separate front panel switch is used to select upper, lower, or both sidebands, providing rapid, simple means of sideband selection. A 455 KC output jack is provided for a Q-multiplier or visual spectrum analyzer.

SLOT FILTER The slot filter provides a notch of better than 60 db attenuation over the entire range of ±5 KCS from the center IF (455 KCS) frequency. The slot filter control provides 40 db attenuation, plus an additional attenuation of up to 20 db obtainable by use of the slot depth control at a particular frequency. The 6 db width of the slot is approximately 1.5 KCS. Accurate frequency adjustment of the slot is obtained by means of an 8:1 vernier control. The slot filter circuit consists of a Bifilar "T" trap.

SEPARATE VERNIER TUNING ±3 KCS vernier tuning allows extra-fine passband tuning between the 455 KCS IF and the 60 KCS IF for additional selectivity and easy tuning of the desired signal.

AVC An extremely fast-attack delayed AVC circuit is employed. A four position control on the front panel permits the selection of OFF-AVC or SLOW-MEDIUM-FAST AVC decay time for optimum results on various signals. The AVC is taken from the high selectivity 60 KCS IF.

S-METER Readings of signal strength and "on-the-point" tuning indications are provided on all types of signals by a high-response S meter circuit. The scale is calibrated to 40 db over S-9 and is factory-calibrated so a signal of approximately 50 microvolts reads S-9. Each S-unit indicates approximately a 6 db increase, equivalent to doubling the signal strength. S-meter is extremely effective on SSB and CW when using slow decay AVC.

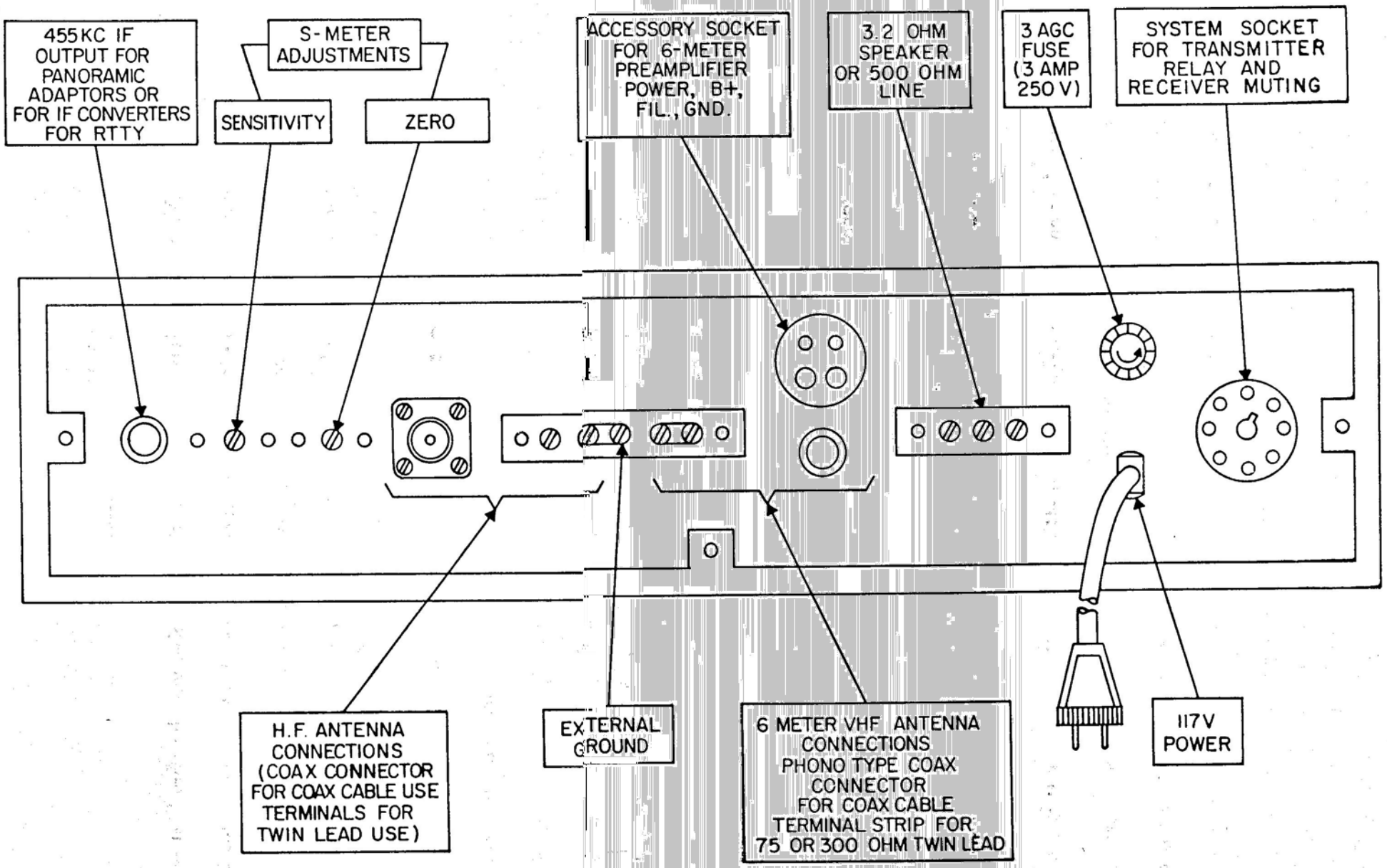
AUDIO The HQ-170-A features the exclusive Hammarlund Auto-Response which automatically adjusts the audio passband to best meet the receiving conditions. A (6AQ5) provides 1.0 watts for maximum undistorted output. The Auto-Response circuit employs controlled feedback which is decreased at the gain control is turned up, thus narrowing the audio passband. As the gain is decreased, the feedback increases, thus permitting a greater frequency response in the audio output. The result is crisper, easier to read sound on weaker signals, and broader, more realistic reproduction on stronger signals.

The audio output may be used with either earphones or loudspeaker. The phone plug automatically silences the speaker upon insertion. The Audio-Response permits tops in listening pleasure of AM, SSB, and CW reception.

144 to 148 Mcs. dial calibration provided for use with converter having output tunable I.F. frequency range of 50 to 54 Mcs.

Your Hammarlund Receiver is designed to give you the very best results. A few minutes to be sure it is installed correctly is worth while. Even though we have developed the most sensitive circuitry to select and amplify the signal you want to hear, remember that it can work only on the RF you feed it from your antenna. It is to obtain the most satisfaction in its operation that we urge you to put up the best antenna system you can. The HQ-170-A will work very well with a temporary wire strung out of a window, but only use this method while constructing or having constructed a proper antenna system. Finally, a good ground, serves many purposes; one, it eliminates tendencies towards AC hum pickup, often straying through homes or apartments; two, it minimizes atmospheric and man-made noise; three, it ensures a safe path for any voltage coming from a possible short or from an associated transmitter. When using an outside antenna, it is always best to install a lightning arrestor. Such a device drains off the atmospheric charge in a safe manner, protecting you, and the Receiver.

Note that all of the Receiver connections are at the rear of the set, and that there are a variety of very useful terminal points, permitting a number of important system connections to be permanently attached in a neat manner. The illustrations on the next pages show you all of them, allowing you full freedom to use those that are most useful to you, whether you are only listening or are operating with a transmitter. The 455 KCS output, the Accessory and System sockets, are all for special applications associated with reception, but not necessary for ordinary operation. The speaker and antenna connections are required in any case.


455KC IF OUTPUT FOR PANORAMIC ADAPTORS OR FOR IF CONVERTERS FOR RTTY
S-METER ADJUSTMENTS
SENSITIVITY
ZERO
ACCESSORY SOCKET FOR 6-METER PREAMPLIFIER POWER, B+, FIL., GND.
3.2 OHM SPEAKER OR 500 OHM LINE
3 AGC FUSE (3 AMP 250 V)
SYSTEM SOCKET FOR TRANSMITTER RELAY AND RECEIVER MUTING
H.F. ANTENNA CONNECTIONS (COAX CONNECTOR FOR COAX CABLE USE TERMINALS FOR TWIN LEAD USE)
EXTERNAL GROUND
6 METER VHF ANTENNA CONNECTIONS PHONO TYPE COAX CONNECTOR FOR COAX CABLE TERMINAL STRIP FOR 75 OR 300 OHM TWIN LEAD
117V POWER

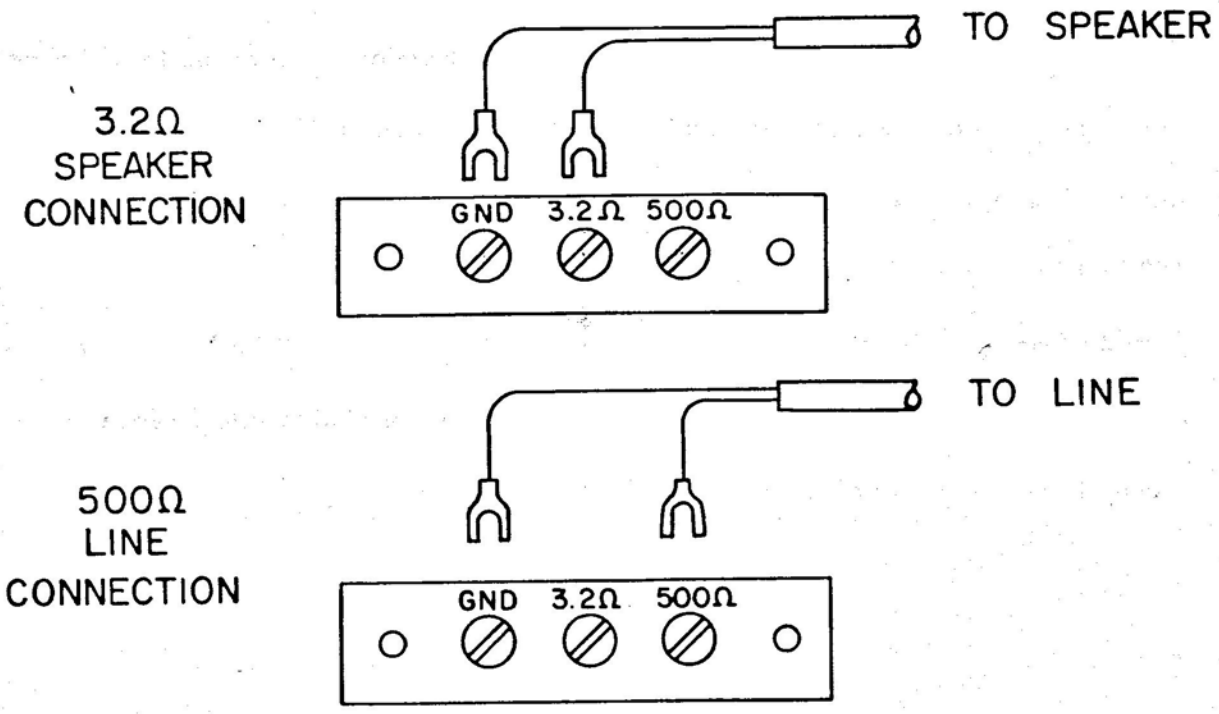
RECEIVER REAR CONNECTIONS

Connect a suitable 3.2-ohm loudspeaker to the 3.2-ohm terminal screws as shown in the diagram. Use a Hammarlund S-200 Speaker for best results, but any equivalent speaker in a cabinet will operate satisfactorily. Do not place the speaker cabinet on top of the Receiver, because the HQ-170-A is a very sensitive set, and speaker vibration can cause regenerative oscillation electronically, impairing reception. Note that a jack is provided in the lower left corner of the front of the Receiver for headphone plug insertion. The loudspeaker is automatically disconnected when the phone plug is inserted.

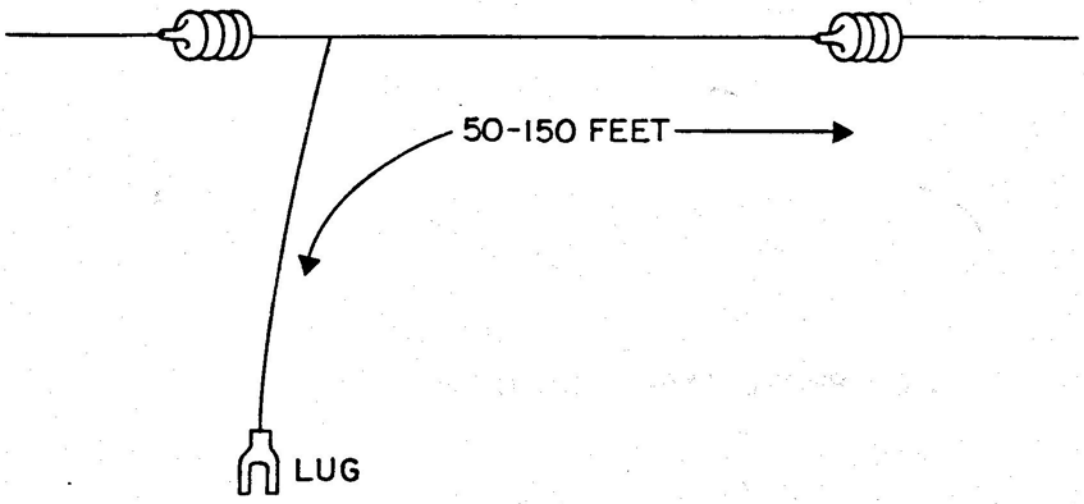
HEADPHONES

High impedance magnetic phones will usually be found satisfactory when the headphone jack is employed. The phones are deliberately mismatched to reduce the level into them. If more level or volume is desirable, low impedance phones may be employed. These may be any of the popular impedances such as 8, 16 or 24 ohms. If you do not have headphones and desire to purchase a pair, the low impedance type is suggested since it will always be possible to reduce the volume by making use of the audio volume control.

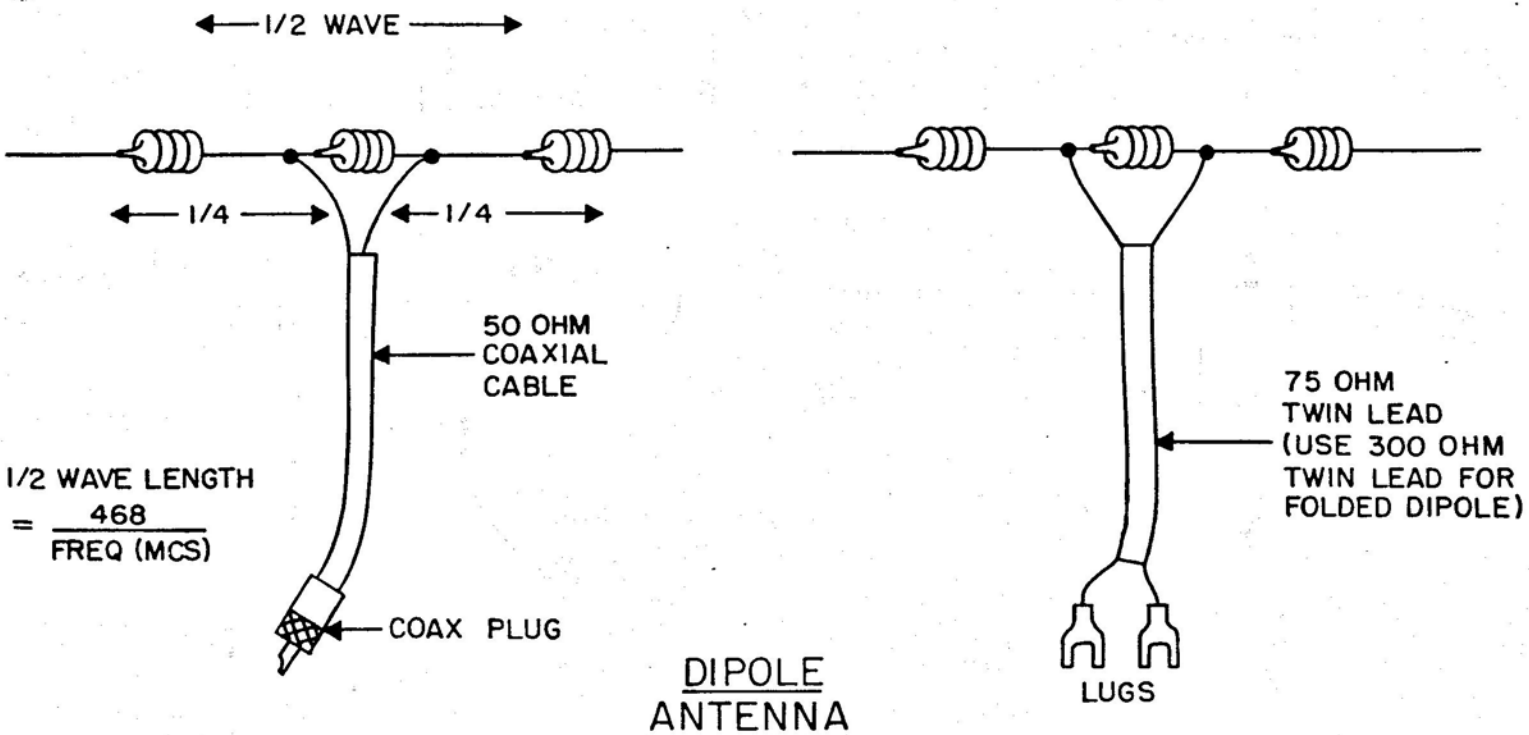
Another alternative, if high impedance phones are available, is to permanently connect these to the 500 ohm line output terminals on the rear of the receiver. These will provide more volume than the headphone jack since the headphone jack impedance is 3.2 ohms or the same as the speaker.



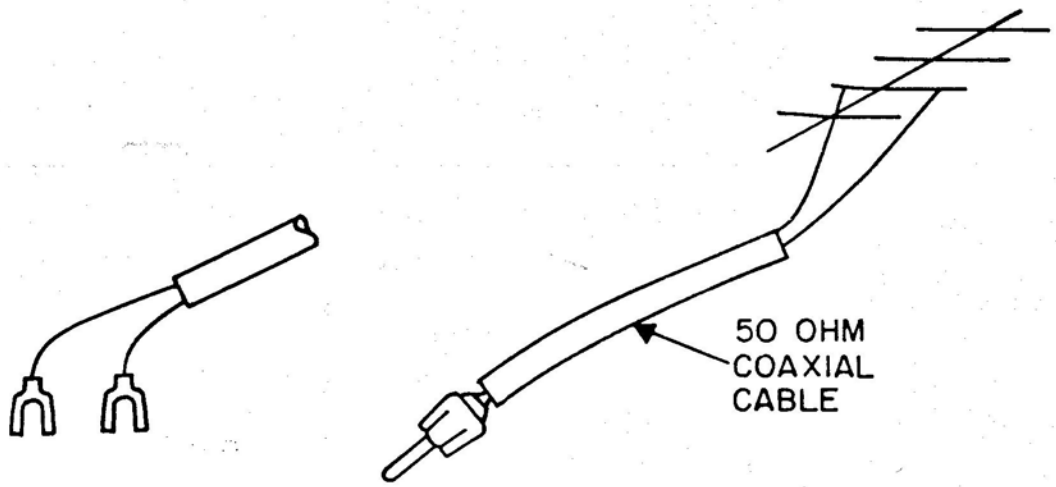
The Receiver connections for the antenna and ground are clearly illustrated on these pages, and a few hints are given for antenna installation, but the HQ-170-A owner is urged to read a good antenna book to select the best type for his purpose. The Amateur Radio Relay League publishes this type of information. Its Antenna Book provides all you need to know about antennas for both reception and transmission. Other publishers produce equivalent books



SINGLE WIRE ANTENNA

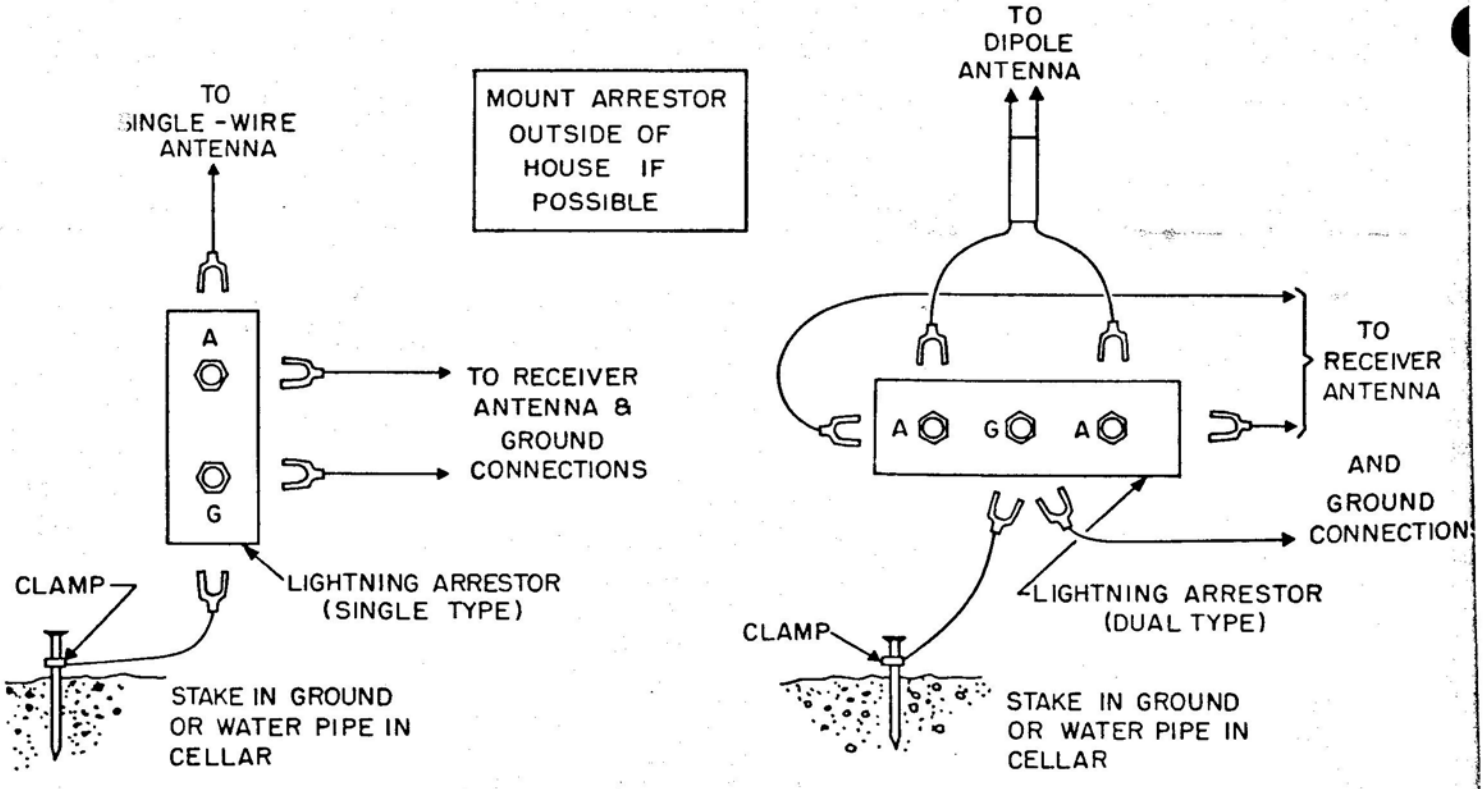


DIPOLE ANTENNA



LUGS OR PHONO TYPE CONNECTOR

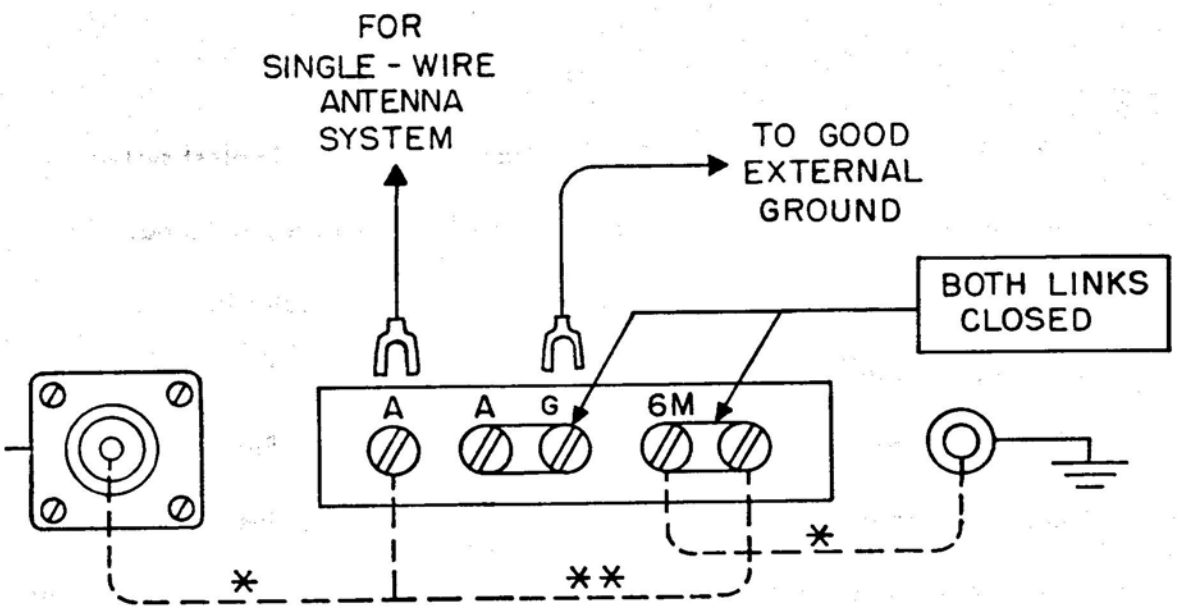
6 METER BEAM ANTENNA



TYPICAL LIGHTNING ARRESTOR INSTALLATIONS

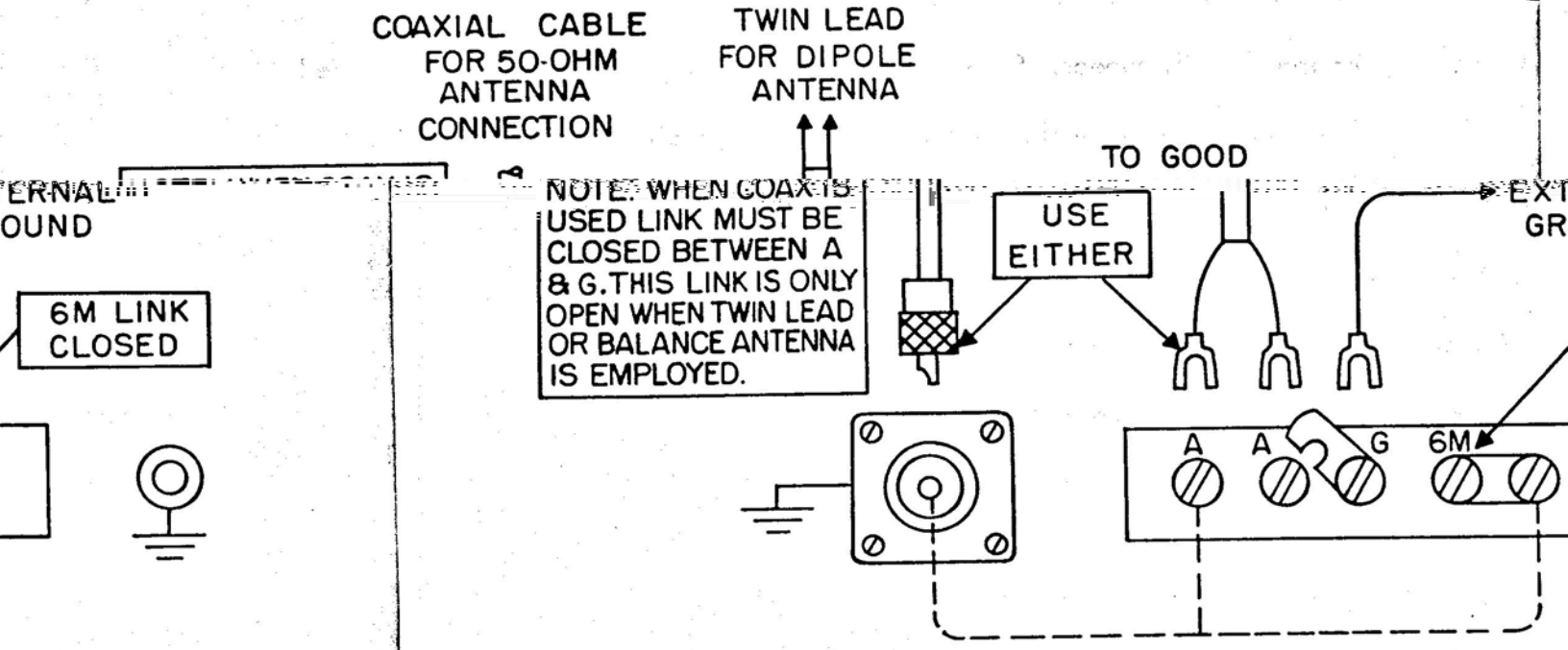
The first antenna connection illustration shows the simplest system, with the 6-meter band fed through the links from the low-frequency antenna. This arrangement provides good overall coverage, but if a particular band is intended to be used consistantly, the use of a dipole tuned to that band is recommended. The illustrations show how such an antenna is made and what Receiver connections are necessary. In each case, the 6-meter band does not receive the best signal. It is possible to make a satisfactory dipole for this band, but a commercial beam is better in performance. For all antennas, the shielded or twin-lead methods are a decided improvement over the single wire to minimize man-made interference and noise signals. In especially noisy areas, this may be the only way to develop an acceptable signal.

Each of the antenna connection schemes require very little wiring complications or soldering technique. For those familiar with soldering, no trouble will appear. For those who have never soldered, it is recommended that some practice be obtained before attaching a pin plug to a shielded cable. However, the experience gained from work on even one hi-fit kit or radio is ample for this work. For convenience, some simple instructions in plug and cable installation are included in this book. Remember not to apply too much heat, just enough to allow solder flow. Excess heat will melt some plastic insulations, possibly causing a short between the center conductor and the shield.



ANTENNA CONNECTIONS FOR SINGLE WIRE ANTENNA

(6M BAND FED FROM LOW FREQUENCY ANTENNA)

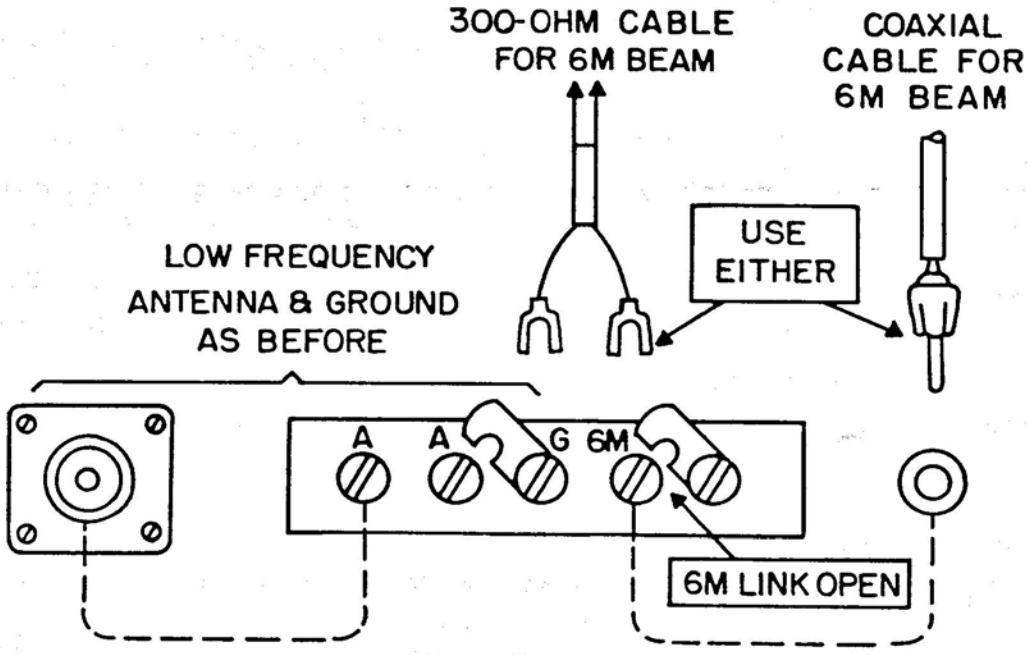


POLE

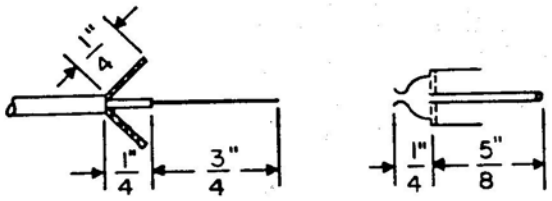
ANTENNA)

ANTENNA CONNECTIONS FOR DI ANTENNA

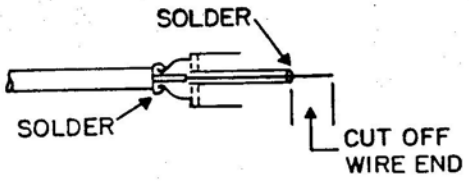
(6M BAND FED FROM LOW FREQUENCY A



ANTENNA CONNECTIONS FOR SEPARATE 6M ANTENNA



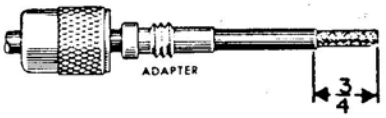
1. STRIP INSULATION.
2. CUT AND SPREAD SHIELD.
3. INSERT CABLE INTO PLUG, CENTER CONDUCTOR THRU PIN. SOLDER CENTER CONDUCTOR, CUT OFF EXCESS.
4. SOLDER SHIELD AROUND OUTER NECK OF BODY.



CAUTION: DO NOT USE TOO MUCH HEAT, CENTER CONDUCTOR INSULATION MELTS EASILY!

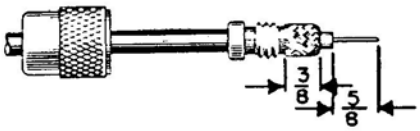
ATTACHING SHIELDED CABLE TO PHONO TYPE CONNECTOR

ASSEMBLY OF CABLES TO 83-1SP PLUG USING ADAPTER 83-168 OR 83-185

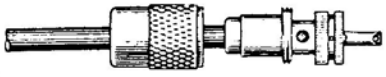


CUT END OF CABLE EVEN. REMOVE VINYL JACKET 3/4". SLIDE COUPLING RING AND ADAPTER ON CABLE.

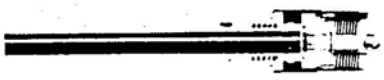
FAN BRAID SLIGHTLY AND FOLD BACK AS SHOWN.



POSITION ADAPTER TO DIMENSION SHOWN. PRESS BRAID DOWN OVER BODY OF ADAPTER AND TRIM TO 3/8." BARE 5/8" OF CONDUCTOR. TIN EXPOSED CENTER CONDUCTOR.



SCREW PLUG SUB-ASSEMBLY ON ADAPTER. SOLDER BRAID TO SHELL THROUGH SOLDER HOLES. USE ENOUGH HEAT TO CREATE BOND OF BRAID TO SHELL. SOLDER CONDUCTOR TO CONTAC



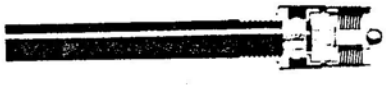
FOR FINAL ASSEMBLY, SCREW COUPLING RING ON PLUG SUB-ASSEMBLY.

ASSEMBLY OF CABLES TO 83-ISP PLUG

CUT END OF CABLE EVEN. REMOVE VINYL JACKET 1 1/8."

BARE 5/8" OF CENTER CONDUCTOR. TRIM BRAIDED SHIELD. SLIDE COUPLING RING ON CABLE. TIN EXPOSED CENTER CONDUCTOR AND BRAID.

SCREW THE PLUG SUB-ASSEMBLY ON CABLE. SOLDER ASSEMBLY TO BRAID THROUGH SOLDER HOLES. USE ENOUGH HEAT TO CREATE BOND OF BRAID TO SHELL. SOLDER CENTER CONDUCTOR TO CONTACT.

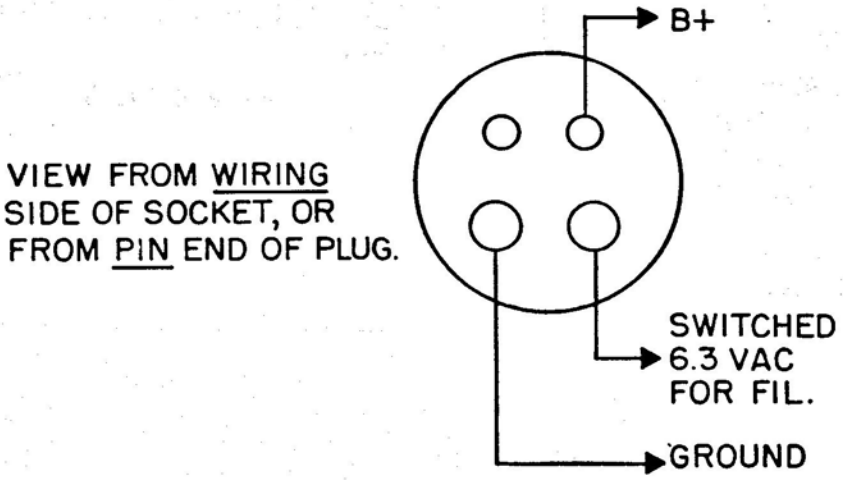


FOR FINAL ASSEMBLY SCREW COUPLING RING ON PLUG SUB-ASSEMBLY.

The 455 KCS shielded pin plug connection is intended to be used as an output feed to such equipment as a panoramic adapter, providing visual indications of stations transmitting across the band, or to feed an IF converter for Radioteletype reception (RTTY). The specific instructions for these units will appear in their manuals.

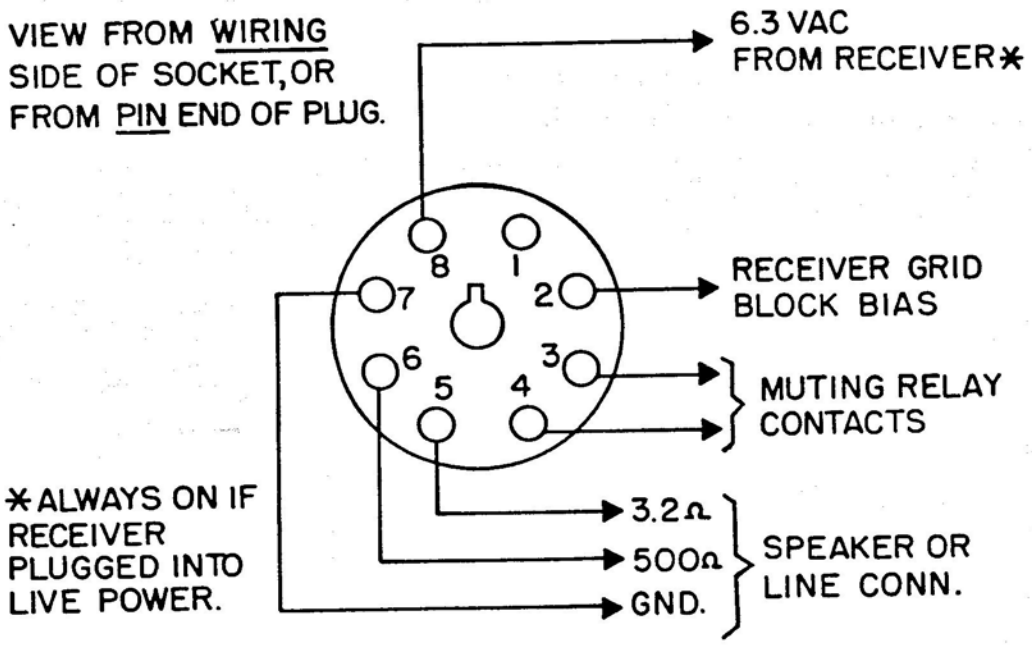
Regular operation usually does not demand extended use in the 6- or 2-meter bands. For the 6-meter band, an external preamplifier will often improve reception, especially if the Receiver is used in a remote area. Two-meter reception with the HQ-170-A will require a converter whose oscillator frequency is such as to result in an IF in the 6-meter band.* The converter output is fed into the 6-meter antenna input in this case. The accessory socket is included on the HQ-170-A chassis for convenience in supplying power to the preamplifier or converter if desired, since many of these units are designed to operate in this manner. Consult their instruction manuals for complete details, wiring as needed from the accessory plug provided with the HQ-170-A.

* 50-54 MCS



ACCESSORY SOCKET CONNECTIONS

The system socket connections provide for a variety of uses, depending upon the transmitter system installed. (Compatibility with Hammarlund HX-50 or HX-500 Transmitters included. See their instruction manuals for details.).



SYSTEM SOCKET CONNECTIONS

HQ-170-A OPERATION

With the antenna, speaker and any accessories installed, you are ready to receive transmissions on the amateur bands. These pages are intended to show you the operating methods that will permit the Receiver to give you the best audible signal possible, considering atmospherics and man-made noise. Three most important reminders:

1. Check the listening aids like the noise limiter and slot rejection filter -- be sure incorrect setting is not reducing Receiver capability.
2. Always tune the Receiver properly to produce the maximum signal.
3. Don't forget the antenna trimmer -- it requires a different setting on each band. This is because antenna impedance changes with frequency; the trimmer is there to allow for a maximum match at all frequencies.

Plug the Receiver line cord into a 117-volt, 60-cycle line (the export model HQ-170-A-E will accommodate 117 or 230 volts, 50 or 60 cycles). Turn the Receiver on, using the RF gain control and the clock timer switch if installed. Check that all tubes are lit. Note that the high-frequency oscillator and mixer tube filaments remain heated at all times, if the line cord is left inserted into a source of AC power. Heating of these tubes eliminate drift that occurs in all oscillator circuits as they heat up. Tube life is not reduced through continuous operation. In fact, its life is often extended to many times normal because it is not subjected

to the hardships of physical expansion and contraction due to heating and cooling when power is applied and removed. If the oscillator has not been maintained heated, then allow one hour for the Receiver to settle down to a steady tuned condition. Readjust tuning as necessary during this period. Do not attempt to calibrate or set the S-meter until drifting has stopped.

The HQ-170-A Receiver is arranged to provide the best reception for AM (voice), for Code (modulated or unmodulated CW), and for SSB (single sideband) operation. To be sure of the best results and the clearest reception, read all of the instructions presented here. Set the controls as shown in each illustration for normal operation, and follow the guidelines to improve performance and to tune over the bands. Become familiar with each control and see what each can do for you. Even after you are familiar in every way with the controls, refer occasionally to these instructions to check that you are still getting the most out of the many features of the HQ-170-A.

Finally, your particular location and installation will affect operation; experiment with control settings to obtain the best results. And consult with us if there are any problems. The Receiver is for your enjoyment, use it correctly, and it will give you years of service.

The Carrier Level S-meter has been adjusted at the factory for correct and calibrated operation, however, two zero adjustments should be checked and reset if necessary; one is mechanical, the other, electrical.

1. With the Receiver turned off, adjust the meter pointer screw on the front face of the meter to set the needle exactly over the zero mark on the scale.

2. Turn on the Receiver; be sure to allow a 1/2-hour warm-up before proceeding further. Set the HQ-170-A to "Receive", and set the RF Gain control fully counterclockwise, without actually turning the set off.

3. Now adjust the meter zero control at the rear of the Receiver chassis again for zero on the meter. A small screwdriver inserted through the chassis is required for this setting. Do NOT adjust the meter sensitivity, this requires a special technique and an input signal generator, not normally available for home use. Check carefully with the rear of chassis illustration to be sure of the location of the meter zero adjust.

GENERAL OPERATING PROCEDURE (ANY MODE)

1. Select mode -- AM, SSB, CW.
2. Set controls for normal operation as shown on the mode illustration -- AVC, RECEIVE, SIDEBANDS, SELECT KCS -- NOISE LIMITER off, SLOT FREQ $\pm$5 KCS, SLOT DEPTH centered, BFO centered, VERNIER TUNING zero.
3. Tune in station -- TUNING RANGE, MAIN TUNING, AF and RF GAIN, ANTENNA TRIMMER -- use VERNIER TUNING for bandspread, or for single side band intelligibility.
4. Readjust special controls for signal reception improvement, noise or interference elimination, etc. -- NOISE LIMITER, AVC, CALIBRATE, SIDEBANDS, SELECT KCS, BFO, SLOT FREQ., SLOT DEPTH.

AM RECEPTION

CLOCK TIMER - SET TO ON, OR AUTO IF DESIRED. INSIDE LID, PULL CLOCK SETTING KNOB TO REAR TO ADJUST TIME. PUSH KNOB TO FRONT TO SET AUTO ON-CONTROL. ONCE ON BY AUTO TIMER, SET MUST BE TURNED OFF MANUALLY BEFORE RESETTING CLOCK.

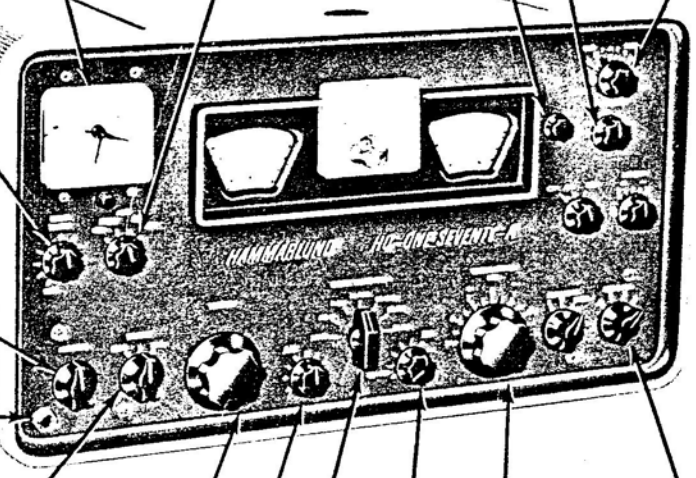
DIAL CALIBRATION - TO BE USED WITH CALIBRATION CRYSTAL. SEE CODE RECEPTION INSTRUCTIONS.

FOR ADDED SLOT REJECTION, SET FOR LEAST UNWANTED SIGNAL. (SEE NOTE 2)

SET TO JUST BEFORE THE POINT WHERE AUDIO OUTPUT STARTS TO DECREASE IN LEVEL. (SEE NOTE 3)

SET TO "SLOW," "MEDIUM" OR "FAST."

IN CASE OF SIGNAL INTERFERENCE, TURN TO POINT WHERE UNWANTED SIGNAL IS LEAST. (SEE NOTE 2)



TUNE FOR MAX. CARRIER LEVEL METER READING.

HEADPHONES

SET TO "RECEIVE" IF RECEIVER IS USED ALONE. IF RECEIVER IS TO BE MUTED BY TRANSMITTER RELAY CONTACTS (REAR CONNECTIONS), SET TO "SEND."

TO USE CALIBRATE CRYSTAL, SEE CODE RECEPTION INSTRUCTIONS.

REDUCE BANDWIDTH IN CASES OF SEVERE INTERFERENCE OR NOISE. (SEE NOTE 1)

VERNIER TUNING KNOB

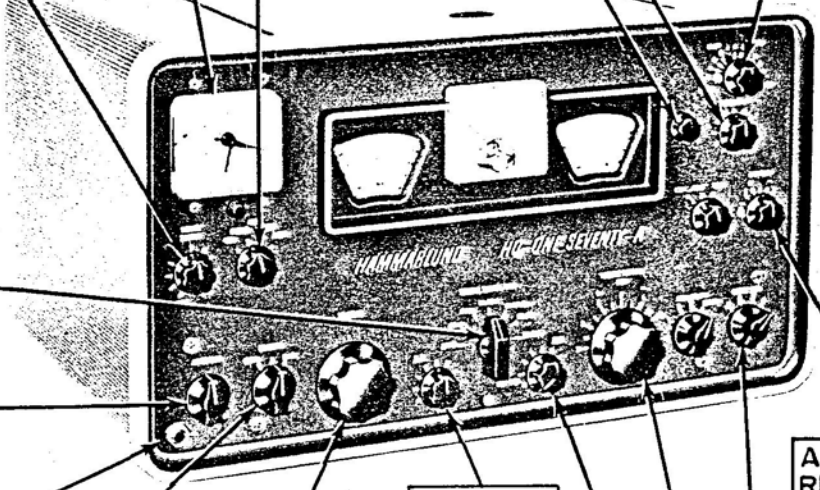
MAIN TUNING KNOB

FOR AM, SET TO MAX. REDUCE IF CARRIER LEVEL METER EXCEEDS +40. S METER CALIBRATION ACCURATE ONLY WHEN RF GAIN MAX, AND AVC IN "SLOW," "MEDIUM" OR "FAST".

SET TO DESIRED VOLUME.

BAND SELECTOR KNOB

CODE RECEPTION



CARRIER LEVEL METER DOES NOT READ WHEN AVC IS "OFF".

CLOCK TIMER SEE AM RECEPTION FOR INSTRUCTIONS.

SET TO JUST BEFORE THE POINT WHERE AUDIO OUTPUT STARTS TO DECREASE IN LEVEL. (SEE NOTE 3)

BAND SELECTOR KNOB

TUNE FOR MAX. SIGNAL LEVEL. (SEE NOTE 4)

HEADPHONES

SET TO "RECEIVE" IF RECEIVER IS USED ALONE. IF RECEIVER IS TO BE MUTED BY TRANSMITTER RELAY CONTACTS (REAR CONNECTIONS), SET TO "SEND".

FOR DIAL CALIBRATION SET TO "CAL". BE SURE BFO AND VERNIER SET TO "0". CHECK THAT AVC IS OFF, AND AM-SSB-CW SWITCH IS ON "CW".

MAIN TUNING KNOB

NOW SET MAIN TUNING TO 100KCS MULTIPLE NEAREST TO STATION WHERE CALIBRATION IS DESIRED. TUNE TO ZERO BEAT. (SEE NOTE 5)

SET TO DESIRED VOLUME.

SET TO DESIRED VOLUME BUT KEEP LOW TO AVOID OVER-DRIVING RECEIVER.

VERNIER TUNING KNOB

AFTER TUNING TO ZERO BEAT, TURN TO SET HAIRLINE EXACTLY ON 100 KCS MULTIPLE SELECTED. TURN BACK TO RECEIVE, RETUNE TO STATION, AND READ FREQ. ON DIAL UNDER HAIRLINE.

FOR ADDED SLOT REJECTION SET FOR LEAST UNWANTED SIGNAL. (SEE NOTE 2)

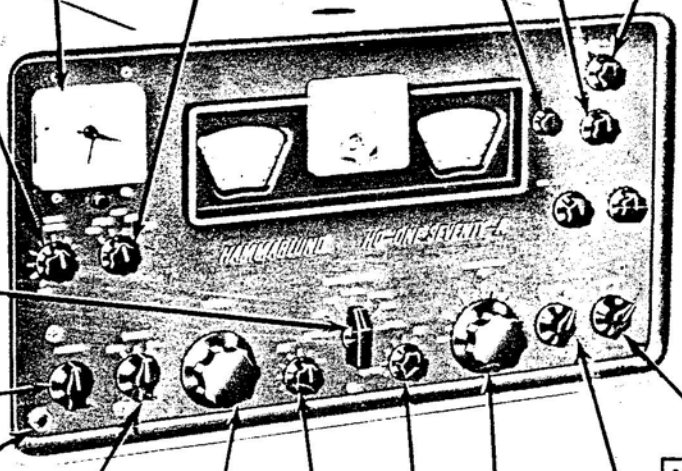
IN CASE OF SIGNAL INTERFERENCE, TURN TO POINT WHERE UNWANTED SIGNAL IS LEAST. (SEE NOTE 2)

AFTER TUNING RECEIVER CORRECTLY, SET TO TONE PITCH DESIRED. (SEE NOTE 6)

SET TO LEAST BANDWIDTH TO REJECT AS MUCH INTERFERENCE AS POSSIBLE.

SEQUENCE OF ADJUSTMENTS

SINGLE SIDEBAND RECEPTION



CLOCK TIMER SEE AM RECEPTION FOR INSTRUCTIONS.

DIAL CALIBRATION - TO BE USED WITH CALIBRATION CRYSTAL, SEE CODE RECEPTION INSTRUCTIONS.

SET TO JUST BEFORE THE POINT WHERE AUDIO OUTPUT STARTS TO DECREASE IN LEVEL. (SEE NOTE 3)

FOR ADDED SLOT REJECTION, SET FOR LEAST UNWANTED SIGNAL. (SEE NOTE 2)

IN CASE OF SIGNAL INTERFERENCE, TURN TO POINT WHERE UNWANTED SIGNAL IS LEAST. (SEE NOTE 2)

SET TO "SLOW OR "MEDIUM".

BAND SELECTOR KNOB

TUNE FOR MAX. SIGNAL LEVEL. (SEE NOTE 7)

HEADPHONES

MAINTAIN 3 KCS BANDWIDTH TO ASSURE INTELLIGIBILITY

SET TO "RECEIVE" IF RECEIVER IS USED ALONE. IF RECEIVER IS TO BE MUTED BY TRANSMITTER RELAY CONTACTS (REAR CONNECTIONS), SET TO "SEND".

TO USE CALIBRATE CRYSTAL, SEE CODE RECEPTION INSTRUCTIONS.

SET TO DESIRED VOLUME.

FOR SSB, SET TO MAX. OR AS DESIRED.

SET TO "U" (UPPER) OR "L" (LOWER) DEPENDING ON SIDEBAND USED. SELECTION RESULTS FROM EXPERIENCE AND METHOD OF SSB OPERATION ON PARTICULAR BAND.

MAIN TUNING - SET FOR LOUDEST SIGNAL, IGNORE INTELLIGIBILITY. (SEE NOTE 8)

SEQUENCE OF TUNING →

VERNIER TUNING ADJUST FOR BEST INTELLIGIBILITY

OPERATION NOTES

AM RECEPTION

1. For best fidelity, use the widest (3 KCS and BOTH) bandwidth. In the presence of interference or noise, reduce to 2 or 1 to increase intelligibility, but fidelity will be decreased.

2. The slot depth control is actually a very gradual vernier adjustment. In view of this its effect will not be very noticeable unless the proper procedure is employed. The suggested procedure is as follows:

   Tune in the crystal calibrator or other strong signal source with a constant carrier to a maximum S meter reading. Whenever the receiver is being tuned for normal reception be sure to first rotate the slot frequency control either the plus or minus 5 KC position. Never leave the slot frequency control at or near the zero setting for normal tuning since the center of the pass band will be slotted out, producing 2 spot tuning or 2 peak S meter readings.

   After tuning the constant carrier to peak the S meter, observing the above precautions, rotate the slot frequency control. It will be noticed that upon approaching the zero setting, the S meter will be effected. A very definite null or minimum S meter reading will be obtained with the slot frequency control adjusted at or near zero. With the slot frequency control set at the minimum S meter reading, the slot depth control should be rotated slowly through its entire range, while observing the S meter. It will be found that at one particular position throughout the range of the slot depth control a further reduction in the S meter reading will be obtained. A very slight readjustment of the slot frequency may now result in a further S meter reading reduction. In some cases, the adjustment of L3 will be required. With the above steps completed and the controls left as they are; take a tuning wand and rotate the slug in L3 for maximum S meter reduction. Be very careful not to move the slug too fast for it should be very close to correct setting. Once these settings have been obtained, the slot depth control and L3 may be left permanently positioned, and all future slot filter adjustment made by the slot frequency control only. A check of the slot depth is advisable, periodically.

3. The automatic noise limiter can reduce noise to the point where its audio level is electrically no higher than the desired signal level. This point is indicated by the start of audio level decrease as the limiter control is rotated clockwise. The proper setting for this control is therefore at the point just before the audio output of the desired signal is reduced. Further rotation decreases noise and signal equally without improving signal-to-noise ratio.

4. Interrupted continuous-wave (ICW) transmissions do not normally provide steady signals for S-meter readings. However, readings can be made fairly well in CW reception using the "SLOW" AVC position of the AVC switch. In any case tune for the loudest signal level heard.

5. The 100 KCS multiples of the Crystal Calibrator will be found at or near the one decimal numbers only, such as 1.9, 14.3, etc. when the Send/Rec/Cal switch is in the Cal position.

6. For code reception, never set tone by adjusting main tuning, because this detunes the Receiver. Always set BFO to zero first, tune receiver for zero beat, THEN set BFO for desired tone.

7. On SSB, carrier level meter fluctuates with audio. Tune for maximum audio or apparent S-meter level.

8. SSB, (Single Side Band) signals can be identified by the lack of a carrier or beat note ("whistle") when tuning across the signal. A Single Side Band signal NOT properly tuned in will sound scrambled and extremely nasal. Adjust the Main Tuning dial for maximum signal strength (to be judged by ear or S-meter). Adjust the Vernier Tuning for maximum speech intelligibility. (The Vernier Tuning must be tuned slowly for effectiveness) Intelligibility can only be obtained by proper choice of upper (u) or lower (l) sideband reception. The BFO (Beat Frequency Oscillator) control is disconnected in SSB position.

9. The accepted or most popular transmission of single sideband signals insofar as the sideband used will usually be as follows:

75 meters	3.8 to 4 mc	Lower Sideband
40 meters	7.0 to 7.2 mc	Lower Sideband
20 meters	14.200 to 14.350 mc	Upper Sideband
15 meters	21.250 to 21.450 mc	Upper Sideband

The use of upper or lower sideband will vary on the other bands covered by this receiver and it is not unusual for the other sideband to be used on the above mentioned bands. If a SSB signal cannot be made intelligible using the vernier tuning control, change to the other sideband switch position. On six meters the sideband switch is reversed due to the high frequency oscillator being used on the low side of the incoming signal which results in the upper sideband being received in the lower sideband position and vice versa.

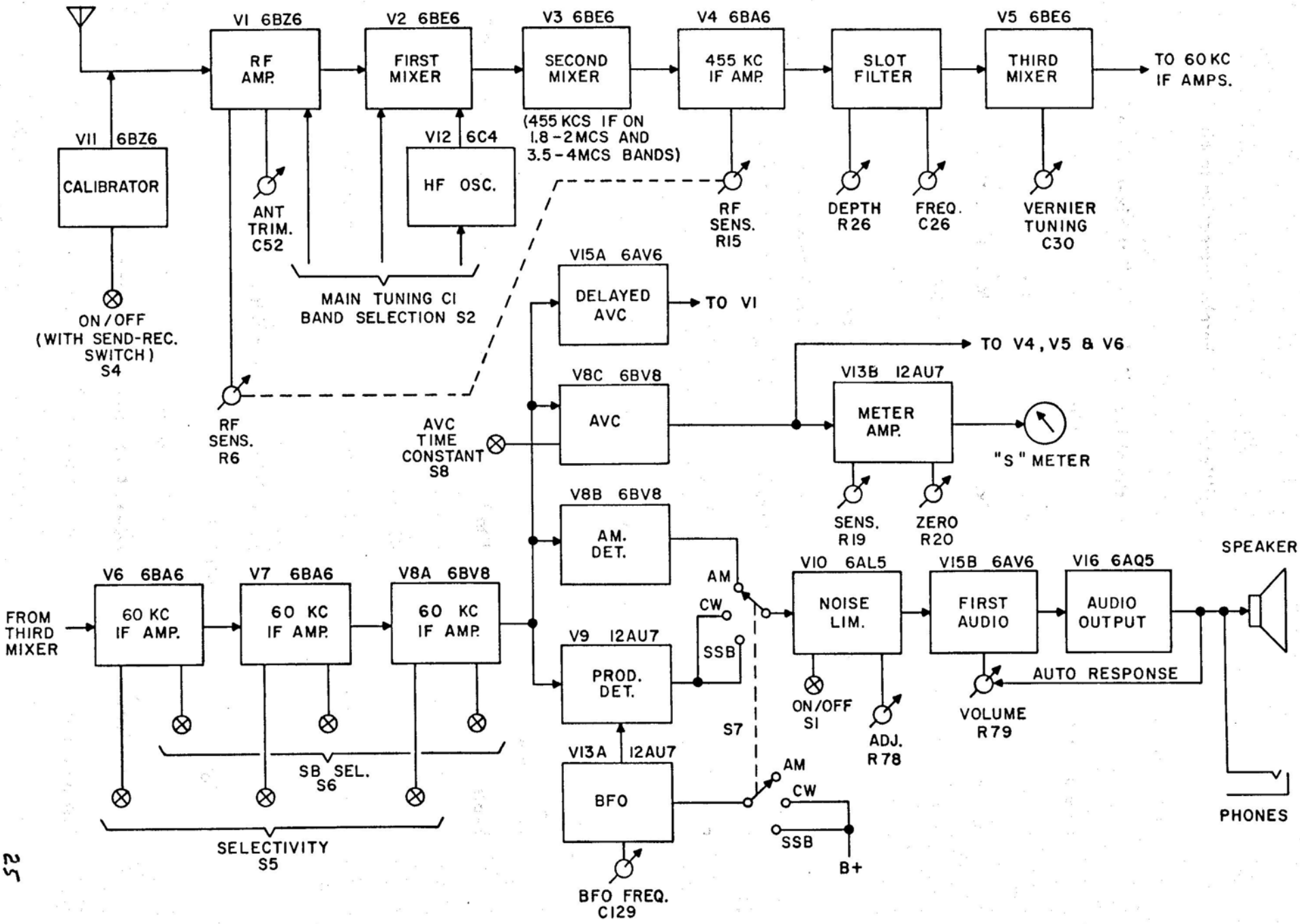
This Receiver has been carefully constructed, inspected, adjusted and aligned at the factory to provide a long period of trouble-free use. Unless you have the proper equipment and the detailed knowledge to service complex electronic circuitry, it is not recommended that any other maintenance but tube testing be attempted. In particular, DO NOT ADJUST TRIMMERS OR TRANSFORMER CORES, because this will reduce the reception capabilities, unless it is done while following the alignment instructions correctly.

Many Receiver troubles can frequently be resolved simply by testing and changing tubes and by making a few minor adjustments, but in order to properly service this set it is important to be able to diagnose obscure troubles through an understanding of the circuits involved. It is for this purpose that this section is provided. A communications receiver of this type contains several special circuits not normally included in the home radio. Examples of such circuits are the BFO (beat frequency oscillator), the slot, triple conversion, delayed AVC (automatic volume control), etc.

The complete circuit of the HQ-170-A is shown in the schematic diagram included at the end of this book. To help in understanding this diagram, a block version is presented on the next page. While reading the text, follow both the block and schematic diagrams -- one will illustrate the overall scheme, while the other will provide all of the connection details.

The RF signal is received at the antenna and applied to the RF amplifier through the antenna terminal strip or shielded connectors, and through the band-switched antenna tuned circuit. The antenna trimmer, compensating for differing antenna characteristics at differing frequencies, is located across the secondary of the antenna transformer. The calibration oscillator, turned on in the calibrate position, applies its signal to the RF amplifier. This oscillator is a crystal controlled type at 100 KCS, developing a very large number of 100 KCS harmonics to cover all of the bands in the Receiver.

To control the Receiver sensitivity, one section of the RF gain control sets the bias of the RF amplifier stage. Rotating the control clockwise decreases



BLOCK DIAGRAM HQ-170A RECEIVER

tube bias, permitting increased amplification and thereby increasing sensitivity to weaker signals.

From the RF amplifier the signal is applied to the first mixer where it is heterodyned with the output of a separate high frequency oscillator. The resulting frequency is the first intermediate frequency (IF). Band switching and frequency tuning occurs in the grids of the mixer and of the oscillator. The arrangement of heterodyning used in this Receiver is listed in the accompanying chart. The stability of the oscillator circuit, a must for accurate and repeatable tuning, is maintained by using a separate tube, and keeping the heater supply on at all times, minimizing drift tendencies. The filament is supplied with power through filament transformer T30 as long as the line cord is connected to a source of power. If the clock is mounted, power will be required at all times.

The chart of the heterodyning scheme shows that the second mixer becomes a 455 KCS amplifier on the two lowest frequency bands. Section S2F of the band switch accomplishes this by removing the crystal circuit from the oscillator portion of the tube at this time. When the oscillator is allowed to work, the first IF signal beats with the oscillator signal to become the second IF. In any case, the output at 455 KCS is available at the pin jack J5 located on the rear of the chassis.

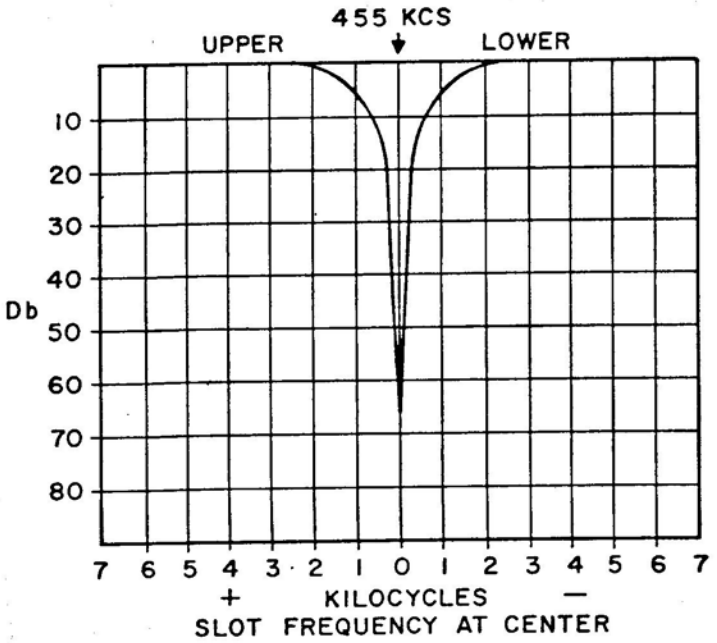
V4 is a 455 KCS amplifier whose gain is also controlled by a second section of the RF gain control, resulting in receiver sensitivity adjustment in the same manner as before.

Before the 455 KCS signal is applied to the third mixer, it is passed through the slot circuit. This circuit is designed to provide a narrow section of frequency rejection capable of being set precisely on an interfering signal. The slot depth control permits its depth or amount of rejection to be set as required for best results. The diagrams show the characteristics and the capabilities of this circuit.

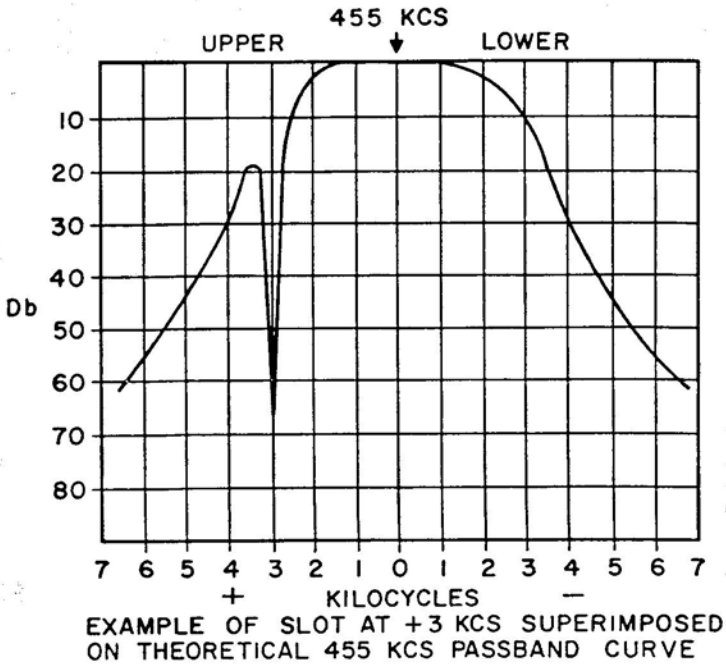
BAND		Frequencies in KCS						
MCS	METERS	RF	1st OSC	1st IF	2nd OSC	2nd IF	3rd OSC	3rd IF
1.8 - 2.0	160	S	S+455	455	(Amplifier Stage)		395	60
3.5 - 4.0	80	S	S+455	455	(Amplifier Stage)		395	60
7.0 - 7.3	40	S	S+3035	3035	2580	455	395	60
14.0 - 14.4	20	S	S+3035	3035	2580	455	395	60
21.0 - 21.6	15	S	S+3035	3035	2580	455	395	60
28.0 - 30.0	10	S	S+3035	3035	2580	455	395	60
50.0 - 54.0	6	S	S-3035	3035	2580	455	395	60
144.0 - 148.0	2	(Dial Calibration Only - To Be Used With External Converter with an IF of 50 to 54 MCS.)						

S = Signal Frequency Received

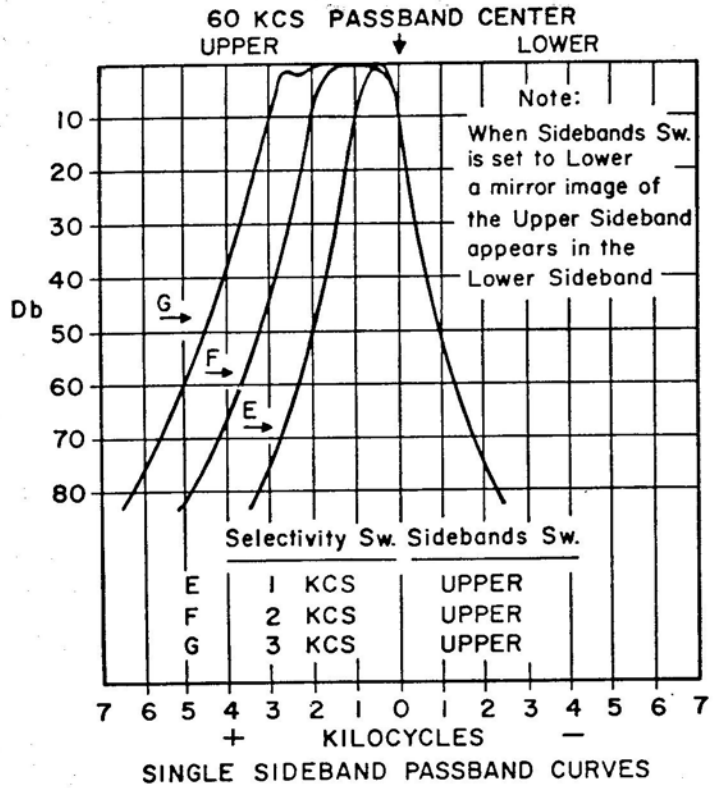
CHART OF FREQUENCY HETERODYNING



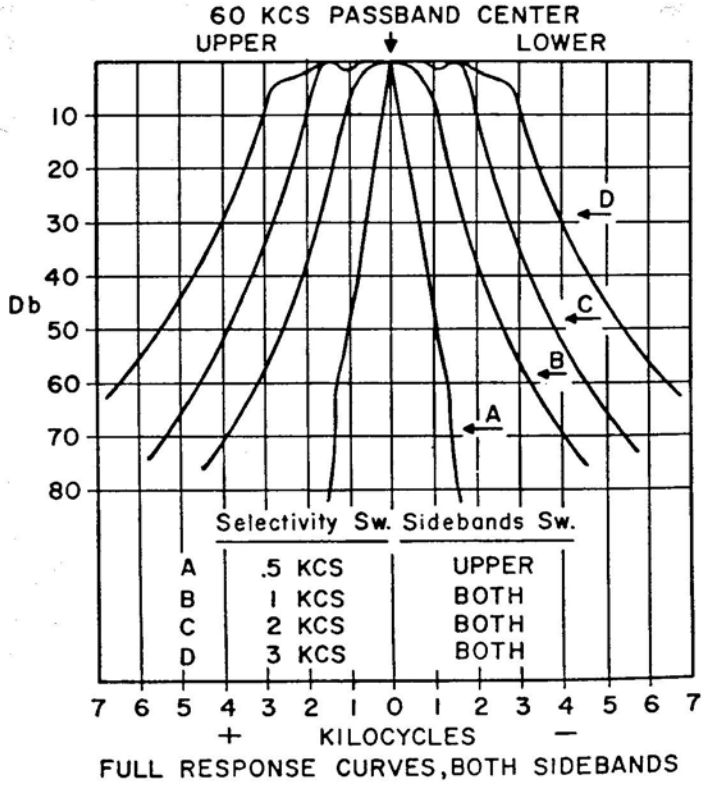
SLOT FREQUENCY AT CENTER



EXAMPLE OF SLOT AT +3 KCS SUPERIMPOSED ON THEORETICAL 455 KCS PASSBAND CURVE



SINGLE SIDEBAND PASSBAND CURVES



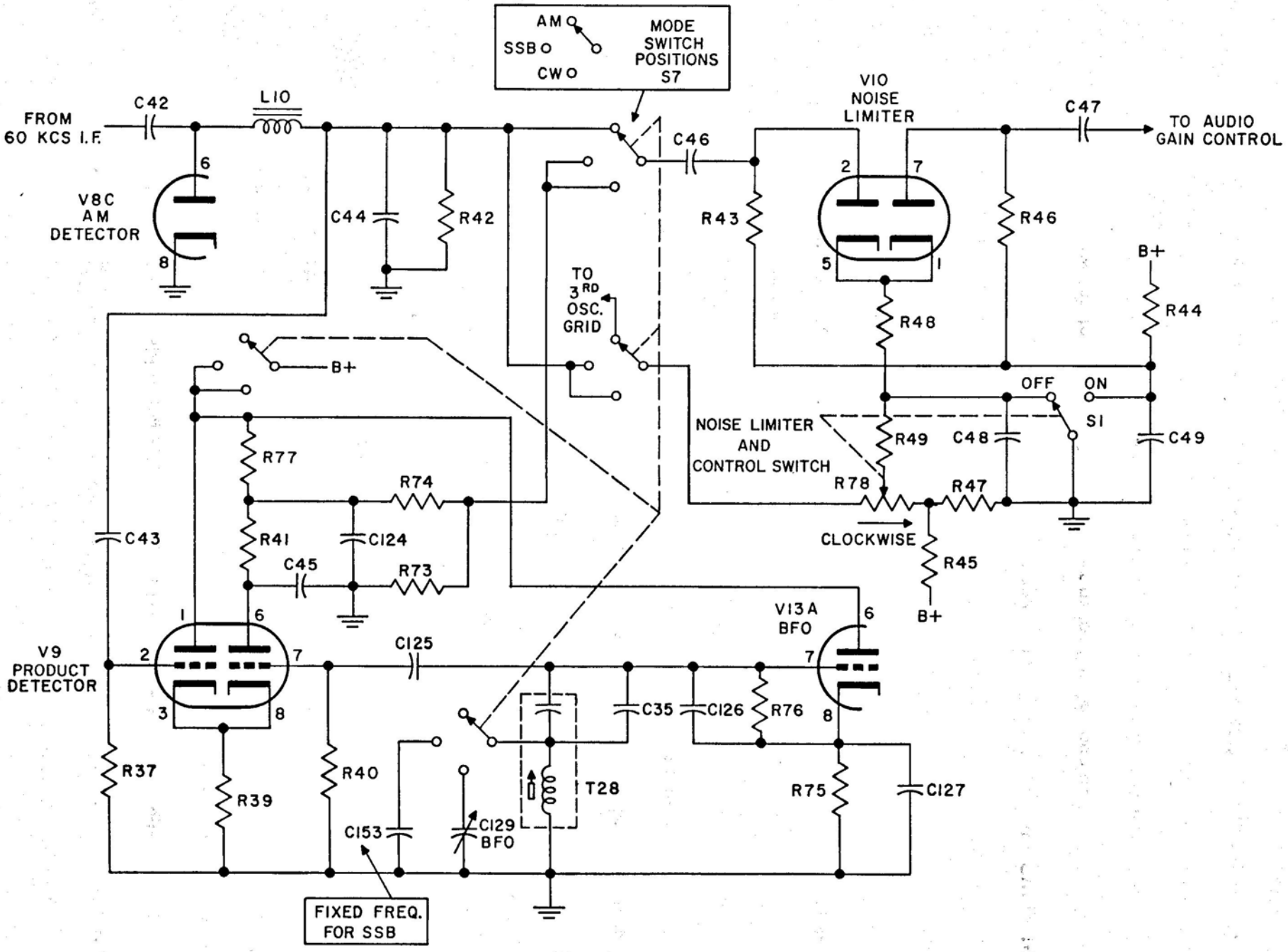
FULL RESPONSE CURVES, BOTH SIDEBANDS

Conversion again occurs to result in a third IF of 60 KCS. Three stages of 60 KCS IF amplification are provided along with means for adjusting the selectivity of the receiver to aid in the rejection of unwanted interfering signals. This is especially useful for code reception where little sidebands are transmitted. A wide band receiver is a detriment here because of such a receiver's capability of amplifying all nearby stations almost as well as the one to be listened to. For single sideband operation, a second switch permits setting the receiver passband for maximum reception only on the side of the carrier required for reception.

The signal delivered from the 60 KCS amplifier stages is then applied to four separate detector circuits, two for efficient audio development, and two for the generation of correct AVC voltages that will assure the best possible reception of all types and levels of RF signals. The general block diagram shows that AM reception is handled by a normal diode detector circuit. See the simplified schematic of the detector, BFO and noise limiter circuits. In the AM position, the resulting audio is passed through the noise limiter tube V10 and on to the audio gain control.

In the CW position, V9 acts as a product detector, and the audio is developed from the beat between the incoming 60 KCS and the output of the BFO at a frequency that is at or near 60 KCS depending on the setting of the BFO control. The BFO is aligned so that zero beat occurs when the BFO control is centered. The audio output is then taken from the junction of R73 and R74 and applied through the CW position of the mode switch to V10 in the same manner as for the AM audio.

Single sideband detection is exactly the same as for CW except that the BFO is a fixed frequency. In SSB operation tuning for intelligibility requires that the suppressed carrier be replaced within the receiver. The BFO does just that, the

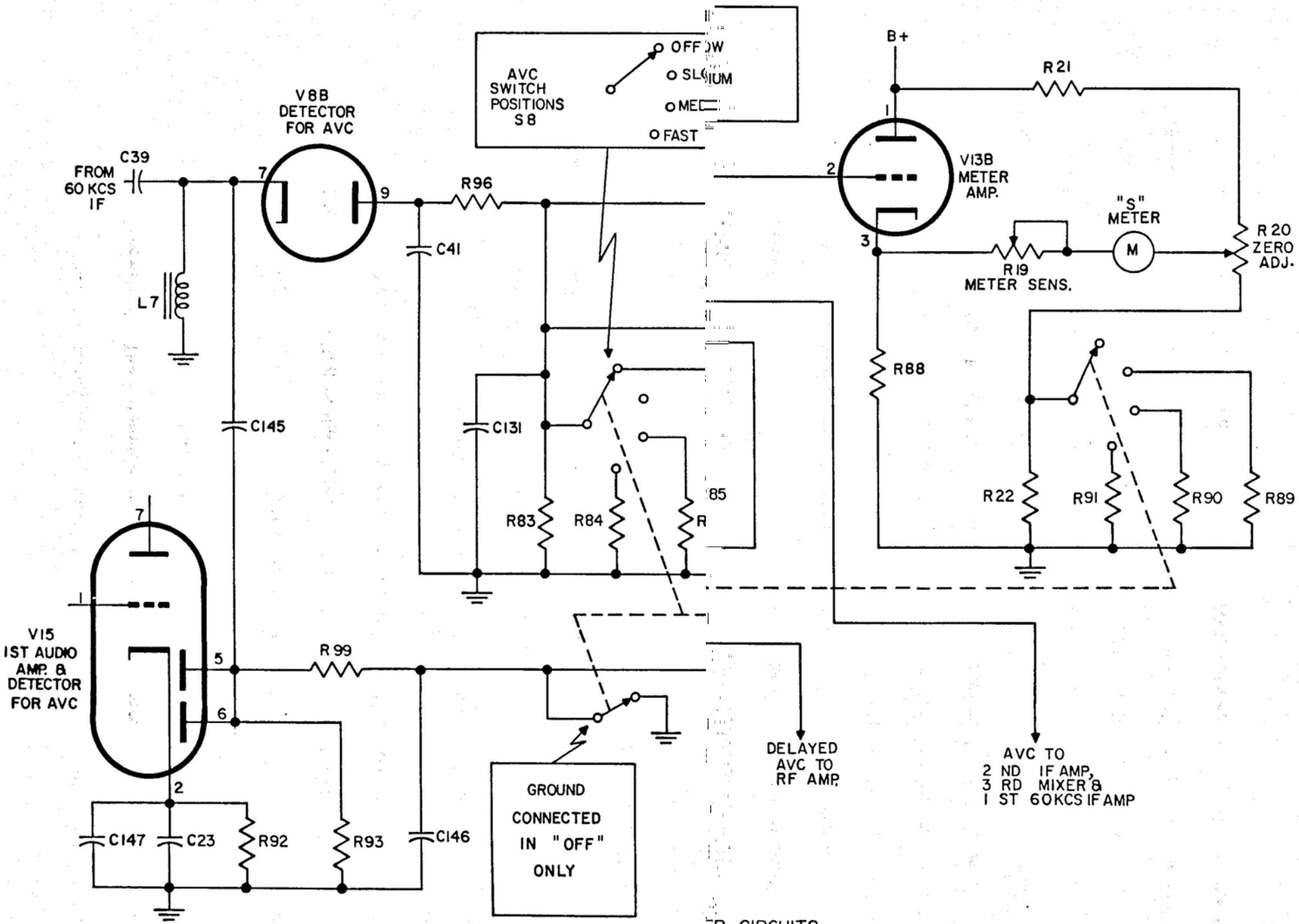


DETECTOR, BFO & NOISE LIMITER CIRCUITS

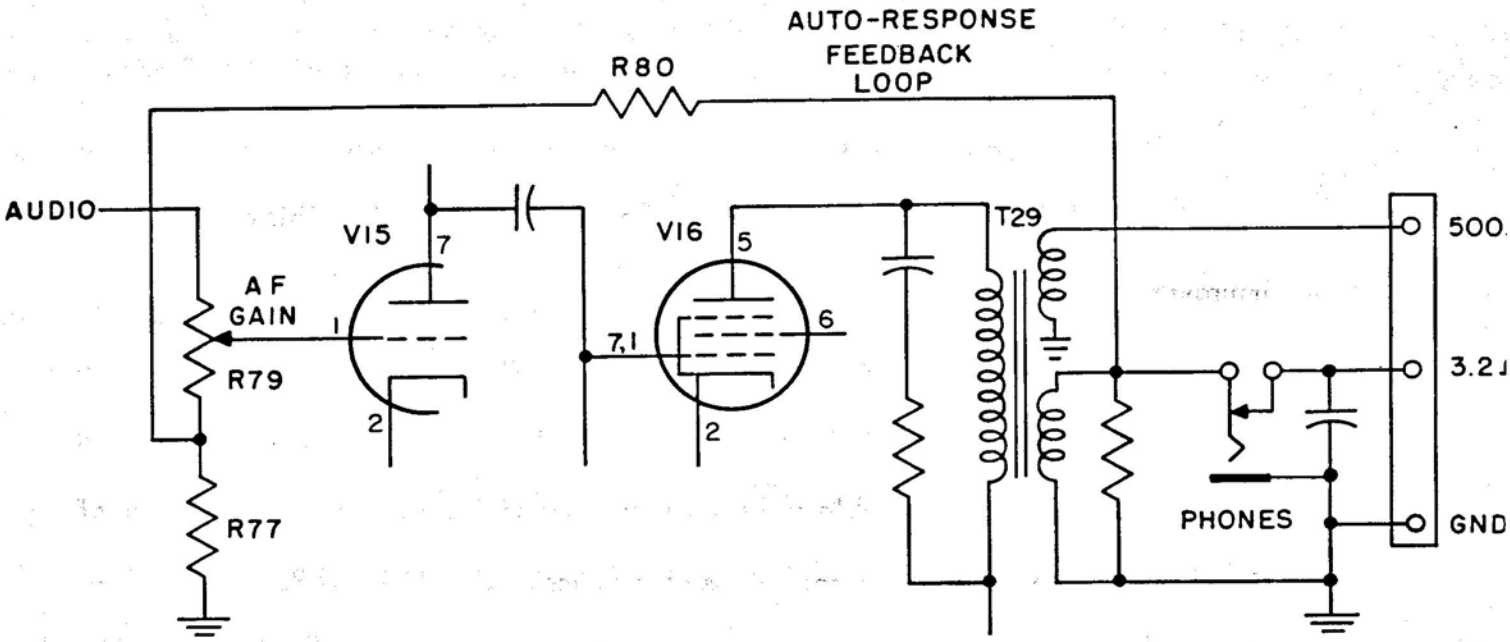
vernier tuning dial being used to precisely tune the receiver to the sideband that has been transmitted. The heterodyning between the BFO frequency and the received sideband produces audio in the same manner as audio is produced for CW.

The noise limiter is a very useful circuit that is designed to assure that no noise or interference signal peaks will be higher than the wanted signal. In the "OFF" position, B + is applied to the plates of V10, while the cathodes are grounded. Since the tube sections are conducting, any signal applied to V10 from the detectors is passed through to the audio gain control. In the "ON" position, the plates are connected to ground, while B+ is applied to the cathodes through the noise limiter control. The circuit is arranged that when the control is at its counterclockwise end of rotation, audio is permitted to pass through almost unreduced. As the control is turned clockwise, the B+ applied to the cathodes increases so that strong peaks are clipped. In operation, it will be noted that the noise limiter is used to clip noise peaks that are higher than the desired audio; the control is therefore turned clockwise until it is noted that the wanted audio starts to be clipped (volume reduced). The correct position of the control is just below the point where this occurs. At this point, maximum clipping is occurring without reducing the wanted signal. The noise limiter is capable of operation on any type of signal, but it should be noted that less noise and interference can often be obtained by reducing the receiver bandwidth as well.

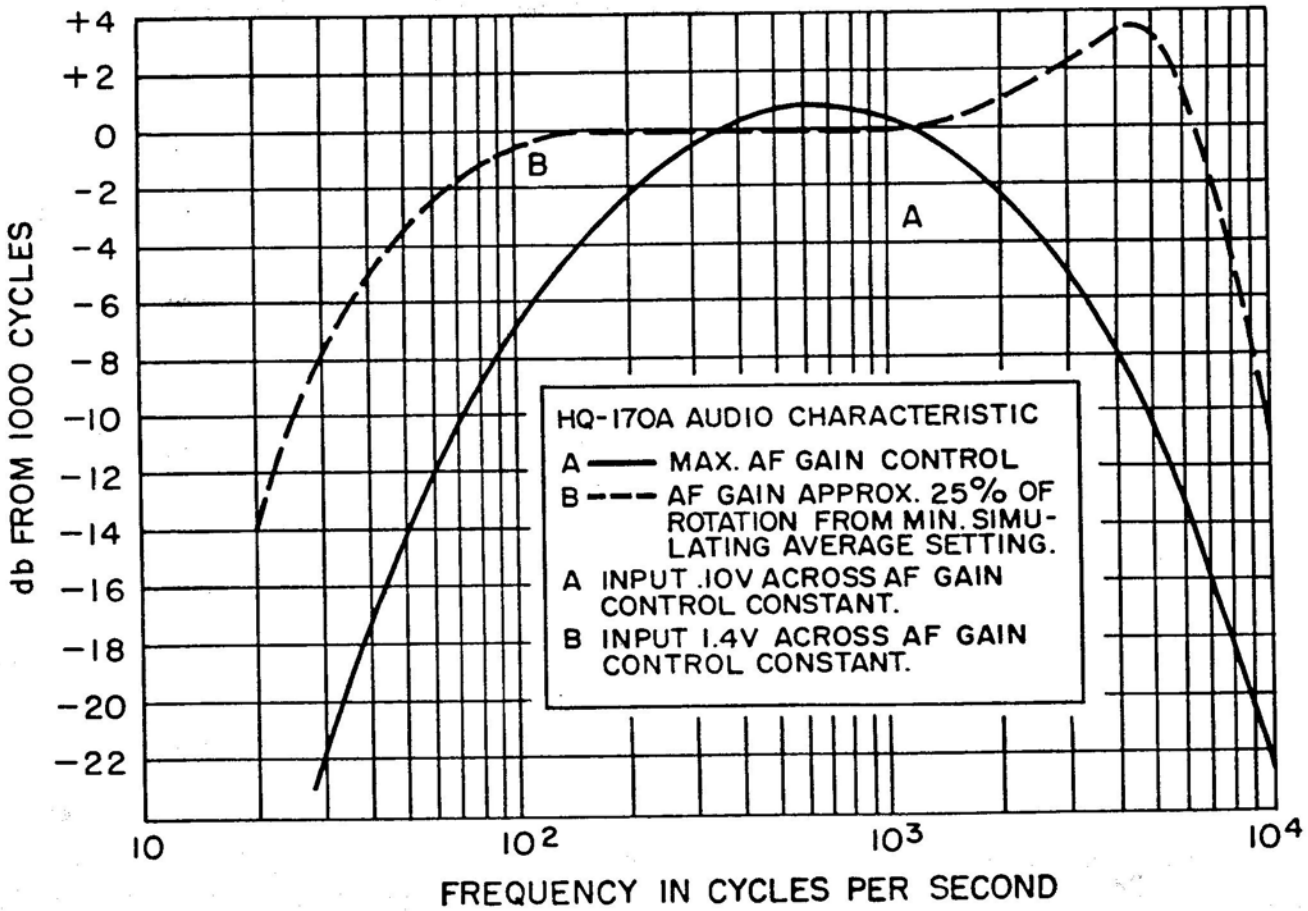
Automatic volume control voltages are developed from the two circuits illustrated. RF detection takes place through both V7B and the diode section of V15. Each circuit is arranged to reduce a negative voltage that will increase as the received signal increases. Except in the "OFF" position, AVC voltages are applied to the RF



AVC & "S" METER CIRCUITS



AUTO-RESPONSE CIRCUIT



AUTO-RESPONSE CURVE

amplifier, to the 2nd IF amplifier, to the 3rd mixer, and to the 1st 60 KCS IF amplifier. The positive voltage developed across R92 prevents AVC from being applied to the RF amplifier until the incoming signal is high enough to overcome it. This delayed AVC improves the reception of weak signals.

The other AVC circuit is not biased in this fashion, but it is designed to allow for an adjustable decay characteristic. AVC is applied immediately, but its decay in the event of fading is adjustable to be slow, medium or fast depending on the type of signal and on the atmospheric conditions of the time. R83, R84 and R85 set the discharge time of C131, creating the appropriate AVC decay.

The carrier level "S" meter circuit operates on the same AVC signal just described. The circuit is a bridge, with the tube and R88 on one side, and R21, R20 and R22 with its switched resistors on the other. The meter is in the center of the bridge, set to zero in the absence of a signal (AVC zero). When a signal is received, AVC is developed, the tube current changes to unbalance the bridge, and the meter reads. The greater the signal, the greater the unbalance, and the higher the meter reading. The sensitivity setting is made only when a signal of known strength is applied to the receiver, usually from a precise signal generator whose output level can accurately be measured.

The audio stages are conventional in nature, except for the special auto-response circuit illustrated. This is a negative feedback system that provides maximum effect at low audio gain control settings. Strong signals are then permitted the highest fidelity of response and lowest distortion, while increasing the gain on weak signals narrows the audio response to improve signal selectivity. An improved signal-to-noise ratio results. A further advantage is the critical damping of the speaker for elimination

of speaker resonance effects. Speech reception is improved and receiver output noise is reduced.

The receiver power supply is arranged to permit the 1st oscillator and mixer to remain heated even when the rest of the set is turned off. As has been previously mentioned, this to provide increased receiver stability. The schematic diagram shows these tubes heated from a separate filament transformer, connected to the power line through only the fuse. The electric clock timer is also connected to the line in the same manner. The timer switch mechanism is in series with the normal on-off switch so that the set can be turned on automatically at any desired time. The timer mechanism is designed that it must be turned off manually to reset the mechanism for automatic turn-on in the next 24-hour period.

Plate voltage regulation is enhanced through the use of silicon rectifiers, and further stability is established with a gas regulator tube for the critical RF stages and for the calibrated "S" meter.

Except for the power transformer primary connections, the supply circuitry for the export version is the same.

Finally, there are the accessory and system sockets, and the send-receive switch, each clearly illustrated on the schematic diagram and self-explanatory. In the send position, the B+ to the RF amplifier, the 2nd mixer and the 2nd IF amplifier is removed, muting the receiver. Further or alternate muting can be applied through the system socket from the transmitter.

HQ-170-A SERVICE AND MAINTENANCE

This section will provide the instructions for the correct servicing of the Receiver. While no particularly unusual procedures are called for, it should be noted that proper tools and test equipment must be available to undertake the electrical alignment. Inadequate or inaccurate test equipment may result in generally poor operating results.

Excessive oscillator drift which is most noticeable on all of the high frequency bands plus a microphonic condition, is usually the result of a poor 6C4 (V12) high frequency oscillator. This tube is also capable of producing a poor beat note with a ripple in it, also especially noticeable on the high bands. Excessive drift can also be attributed to a poor 6BE6 (V2). This tube can also cause hum modulation most evident on the two highest frequency bands. Sometimes interchanging the 6BE6s between V2 and V3 can produce a noticeable improvement.

Normally there is no reason to remove the chassis from the cabinet, because the top cover allows access to all of the tubes, and to the clock adjustment. However, in the case of RF and IF alignment, it will be necessary to take the chassis out to gain access to the under-chassis alignment settings.

Further disassembly is not recommended except in the case of dial cord replacement. As this is a steel cable, breakage is unlikely, but if it should, it will be required to remove the front panel from the chassis, and to remove the two calibrated dials.

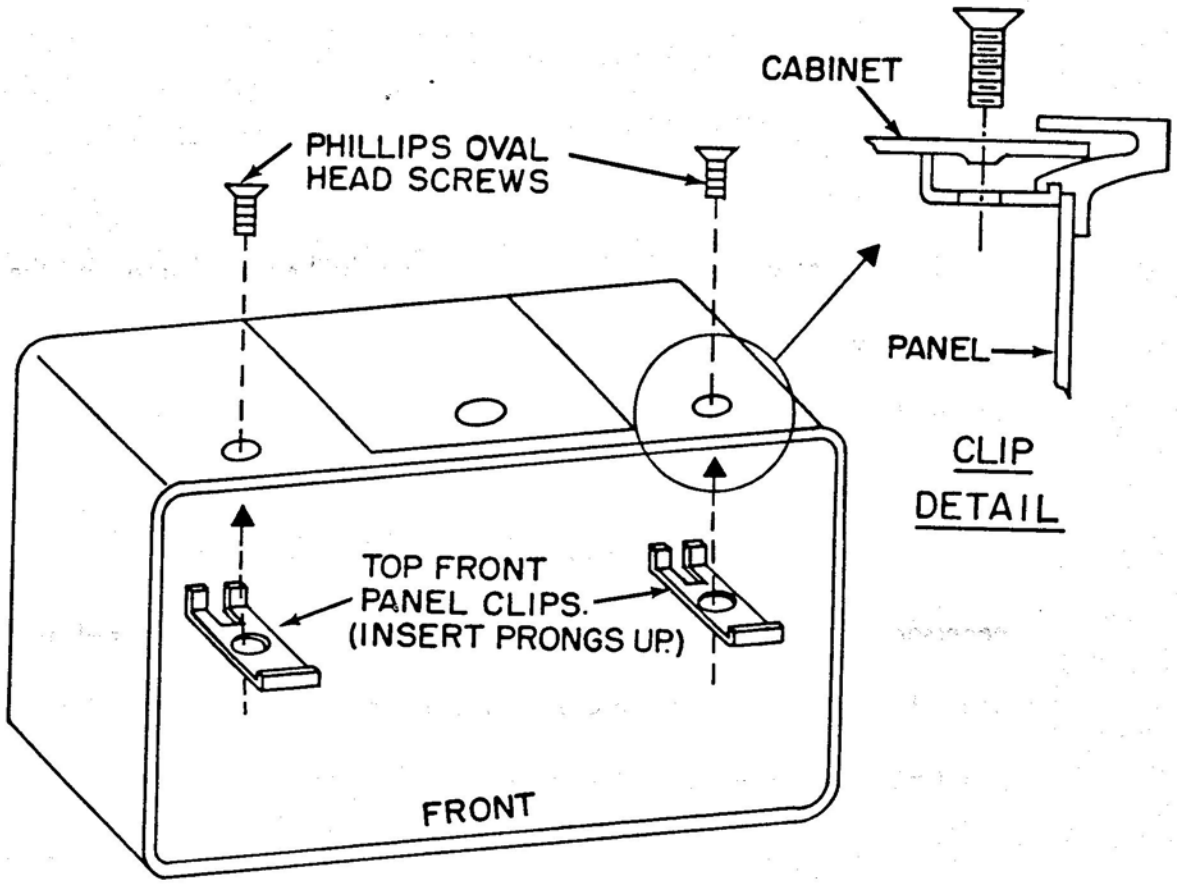
The instructions for the removal of the chassis from the cabinet, and for the disassembly of the front panel, are presented here. Follow the instruction steps with care, and there will be no trouble identifying and replacing all of the parts. Note particularly the knob and dial alignment procedures.

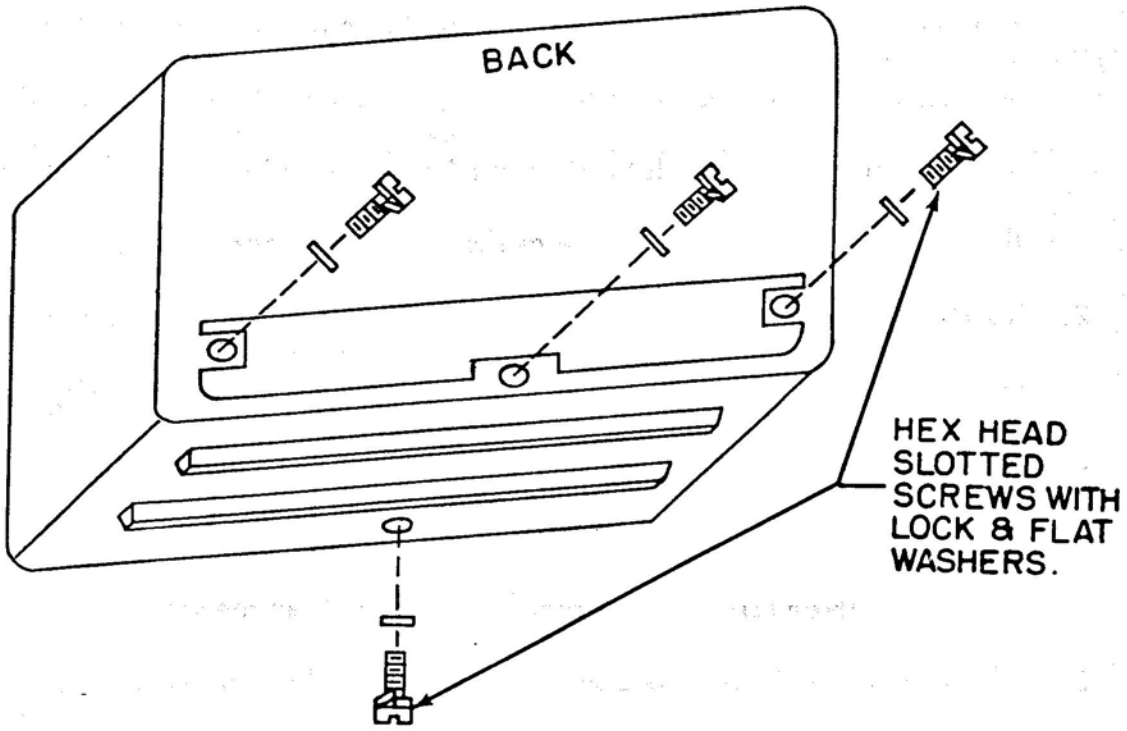
Removing Receiver Chassis from the Cabinet

1. Disconnect all wires and cables at the rear of the chassis.
2. Tip the cabinet up from the front and remove the hex head screw on the bottom.
3. Remove the three hex head screws at the back of the cabinet.
4. Loosen the two Phillips head screws at the top front of the cabinet; do not remove them.
5. Slide the panel and chassis forward to clear the cabinet. Guide the line cord as necessary. It is advisable to set the chassis down so that the panel overhangs the edge of a table. This will protect the panel finish, and relieve strain on the panel mounting screws.

Replacing Receiver Chassis in the Cabinet

1. Slide the chassis and panel into the cabinet, guiding the line cord through the rear opening as necessary. Check that the "L" bracket under the chassis does not catch under the cabinet as the chassis is slid into it. Make sure the cabinet edges are fitted into the slot around the inside edge of the panel. Check that the clips fit under the panel edge as shown in the illustration.
2. Insert the three screws, lock and flat washers in the back of the cabinet. Do not tighten firmly yet.
3. Tip up the cabinet and insert the screw, lock and flat washer in the bottom front of the cabinet. Do not tighten yet.
4. Tighten the three screws in the rear first, then tighten the screw on the bottom.
5. Tighten the two Phillips head screws in the top of the cabinet.





HARDWARE TO FASTEN CHASSIS TO CABINET

Removal of the Front Panel from the Chassis

Refer to the diagrams for the locations and identification of all parts.

Step 1. Remove all knobs except those of the clock and dial calibration. Turn all capacitors so that their plates are fully meshed.

Step 2. Remove the following:

Nuts from the controls shown on the diagram.

Nut and lock washer from the headphone jack.

Screws and lock washers from the capacitors. Pry off the two red pointers; be careful not to bend them.

Step 3. On the back of the front panel, remove the following:

Large nuts and fiber washers.

Dial calibration drive discs.

"S" meter lamp assembly.

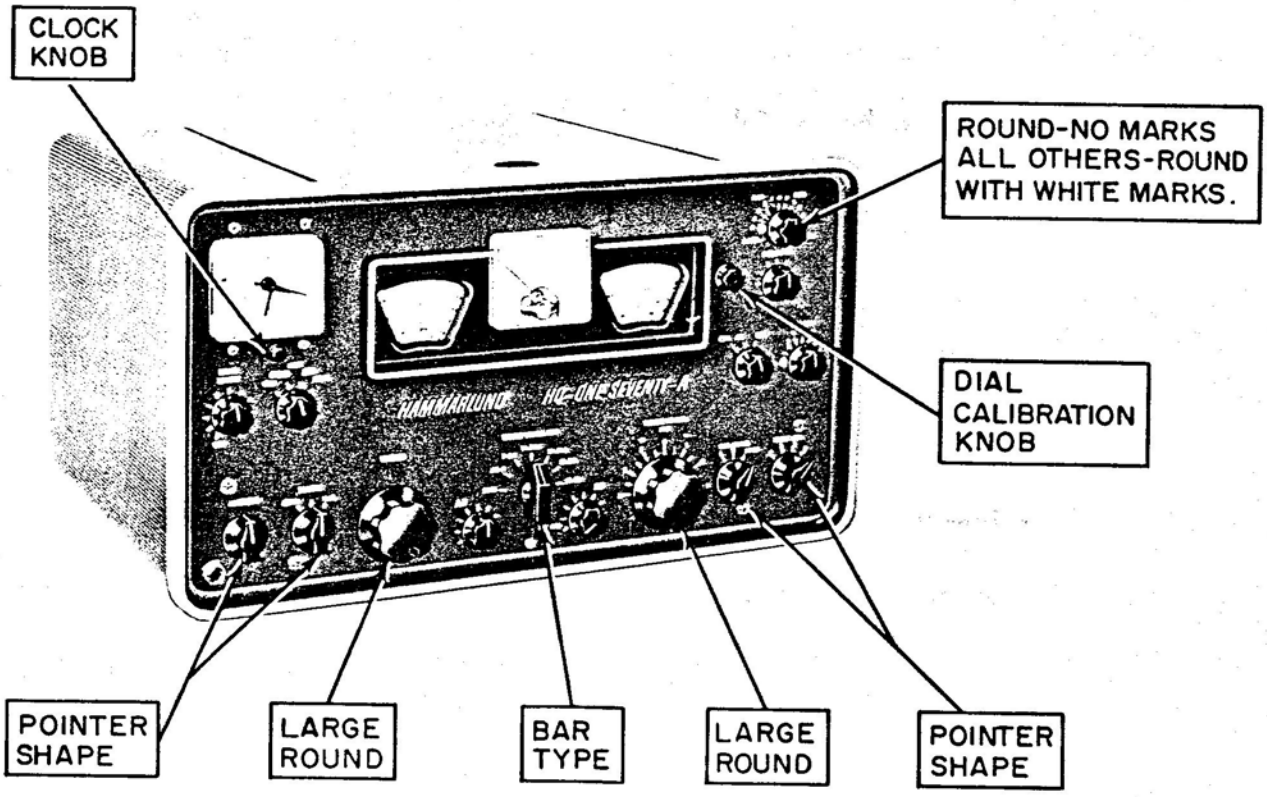
Unsolder the two wires to the meter, and the three wires on the clock. Pull off the other two lamp assemblies for working convenience in later steps.

Step 4. On the front of the panel, remove:

Four Phillips screws and nuts.

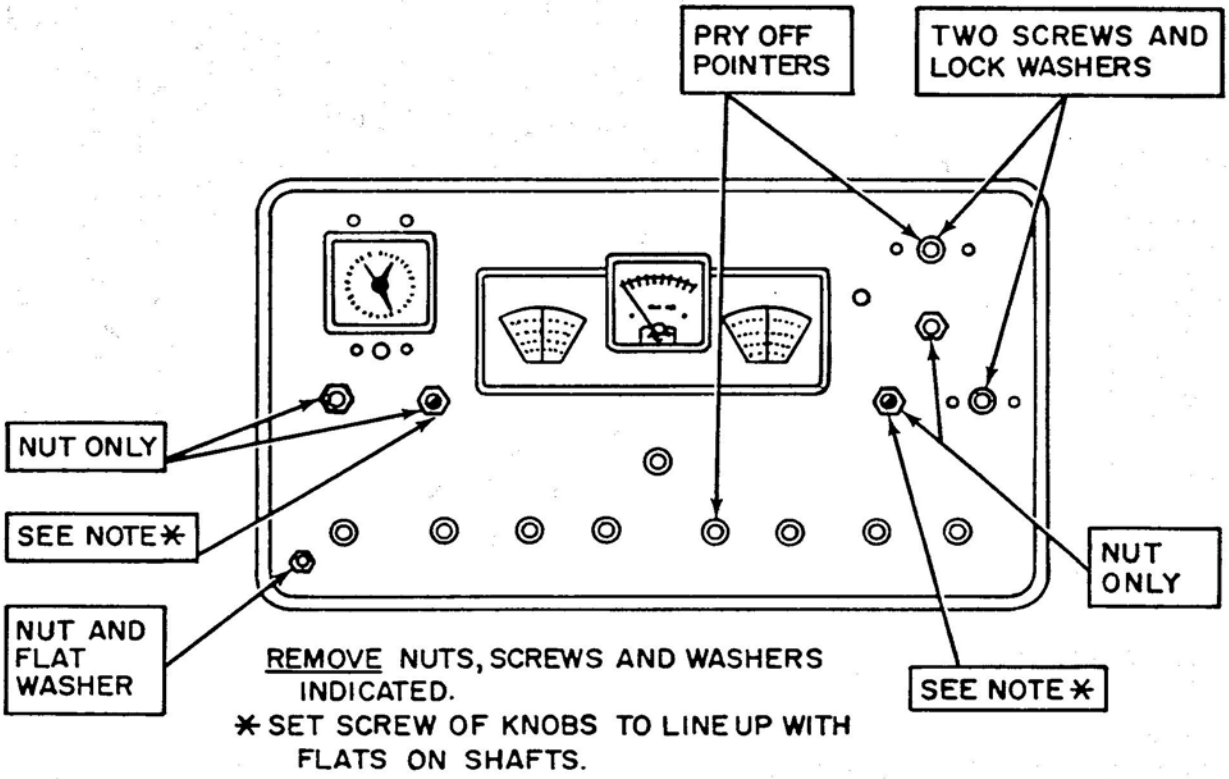
One smaller Phillips screw and "L" bracket. Hold panel to prevent it from falling as the last screw is removed.

This completes the removal of the front panel. To replace the dial cord, continue with Step 5.



REMOVE ALL KNOBS EXCEPT CLOCK AND DIAL CALIBRATION

STEP 1



REMOVE NUTS, SCREWS AND WASHERS INDICATED.

* SET SCREW OF KNOBS TO LINE UP WITH FLATS ON SHAFTS.

CAUTION TO PREVENT DAMAGE TO CAPACITOR PLATES, MAKE SURE THEY ARE FULLY MESHED.

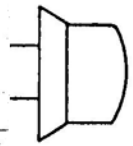
STEP 2

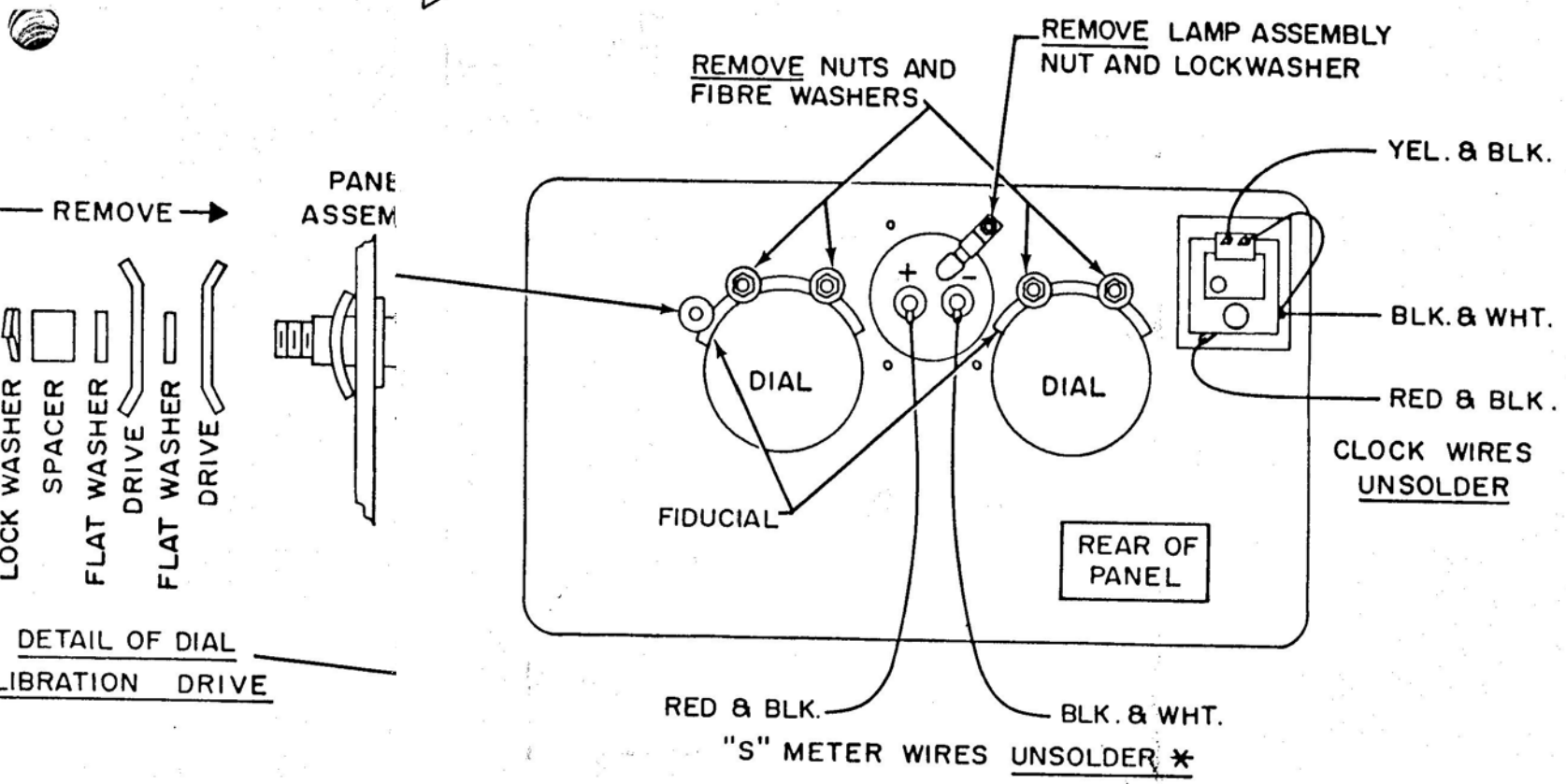
R

*

EL

BLY

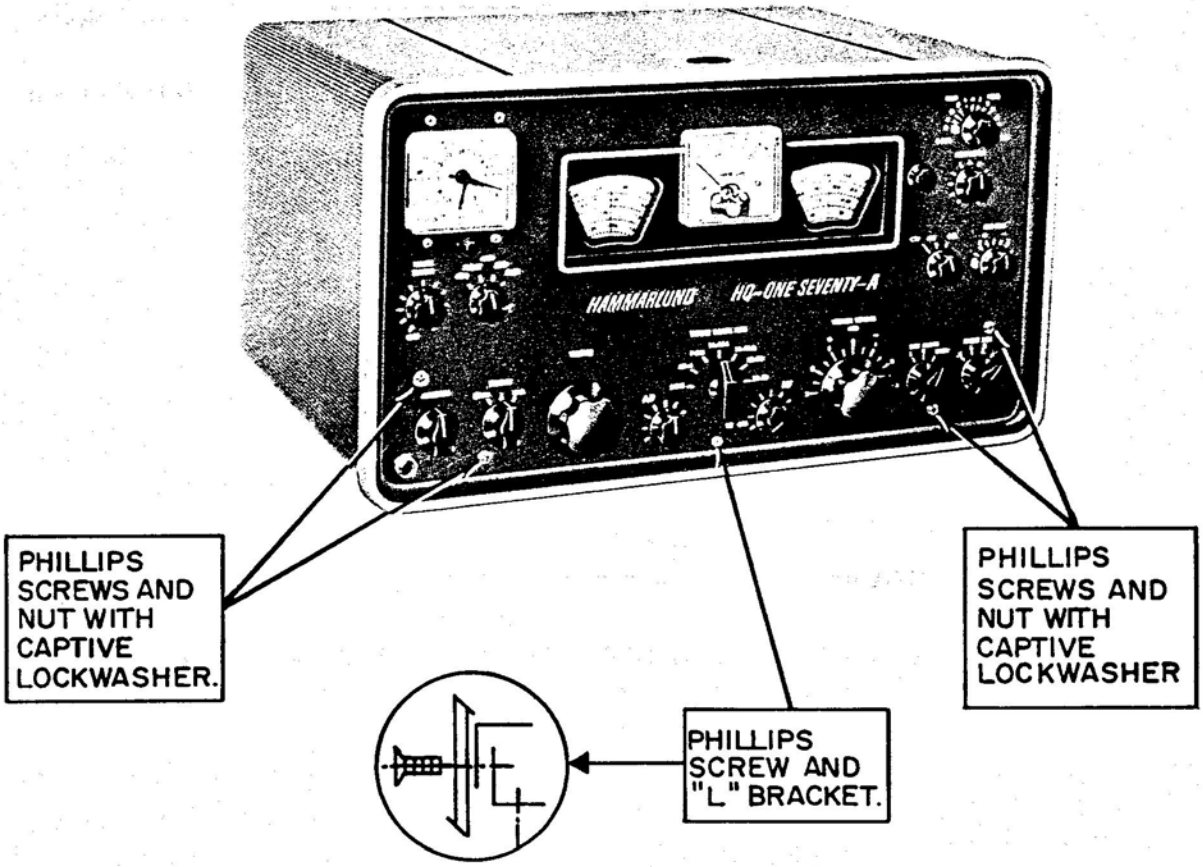




EMOVE AND UNSOLDER AS INDICATED - FOR CONVENIENCE, - PULL OFF OTHER TWO LAMPHOLDERS.

· DO NOT REMOVE NUTS FROM METER, THESE ARE INTERNAL MOUNTING STUDS.

STEP 3

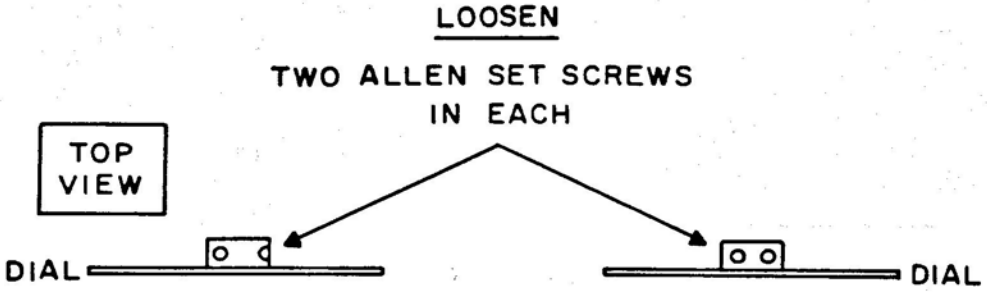

HAMMARLUND HQ-ONE SEVENTY-A
PHILLIPS SCREWS AND NUT WITH CAPTIVE LOCKWASHER.
PHILLIPS SCREWS AND NUT WITH CAPTIVE LOCKWASHER
PHILLIPS SCREW AND "L" BRACKET.

REMOVE SCREWS, NUTS AND BRACKET INDICATED

CAUTION – HOLD PANEL TO PREVENT FALLING

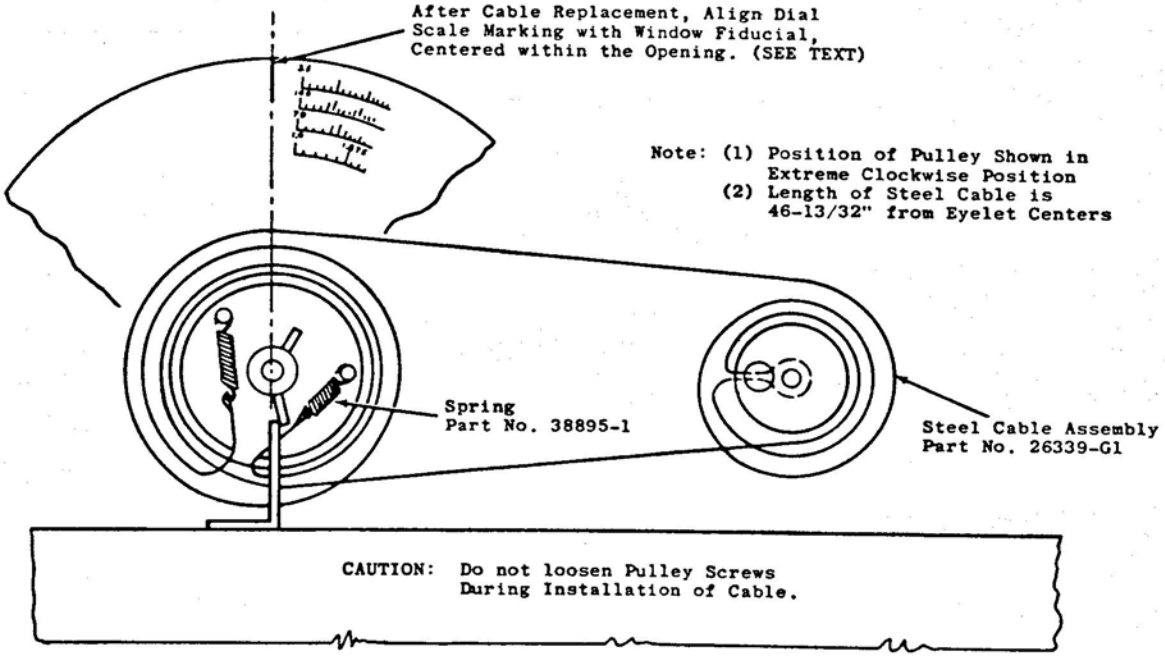
STEP 4

Step 5. Loosen but do not remove the set screws on the two dials. DO NOT MOVE THE SET SCREWS OF THE PULLEYS. Now pull the two dial assemblies forward, at the same time guiding the left dial out of the tuning drive discs.



REMOVE COMPLETE DIAL ASSEMBLY AS ONE PIECE, PULL FORWARD AND OUT OF DRIVE.

STEP 5.


After Cable Replacement, Align Dial
Scale Marking with Window Fiducial,
Centered within the Opening. (SEE TEXT)
Note: (1) Position of Pulley Shown in
Extreme Clockwise Position
(2) Length of Steel Cable is
46-13/32" from Eyelet Centers
Spring
Part No. 38895-1
Steel Cable Assembly
Part No. 26339-G1
CAUTION: Do not loosen Pulley Screws
During Installation of Cable.

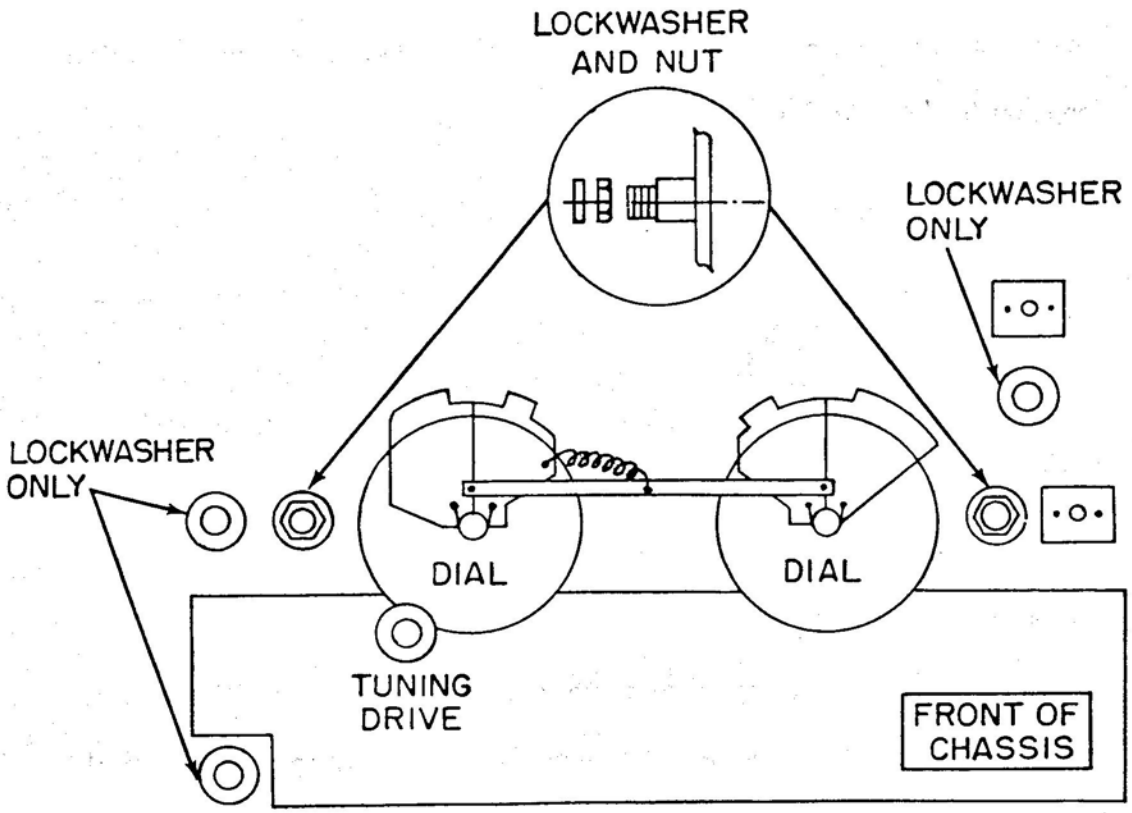
DIAL CABLE ASSEMBLY

STEP 6

Step 6. Follow the instructions below, referring to the Step 6 illustration as needed, to be sure of correct cable installation.

1. Fold the dial cable in half, and insert the bent-loop end into the small hole of the smaller pulley and loop the dial cable around the shaft.
2. Wrap one half of the dial cable around the smaller pulley for 3/4 of a turn in a clockwise direction. Guide this half of the cable underneath the larger pulley and wrap around the larger pulley one complete turn clockwise, then hook the spring to the hole on the right side.
3. Wrap the other half of the cable 1-3/4 turns counterclockwise and guide this end to the larger pulley. Loop around the larger pulley 1-1/2 turns counterclockwise and hook the spring to the hole on the left side.
4. Turn the pulleys back and forth, and manipulate the cable until the tension on the springs is about equal.

This completes the installation of the dial cable. To replace the dials, the front panel, the controls, and the knobs, continue with Step 7.



HARDWARE FOR MOUNTING CONTROLS - WHEN PANEL IS REMOVED

STEP 8

After Step 10 is completed, check that the dials and the dial calibration system operate smoothly and without interference. If necessary, loosen the front panel screws of Step 4 and readjust panel positioning to obtain proper dial operation.

Step 11. Replace the two red pointers by pushing them onto the inner shafts. Be careful not to bend them. Follow the instructions on the Step 11 diagram for capacitor plate meshing, then replace all knobs. Knob identification appears in the Step 1 illustration.

Step 12. This step is for dial alignment.

Reconnect the Receiver and turn it on. Allow it to warm up for about a half hour.

After the warm-up period, tune in to 14 MCS and turn on the crystal calibrator (see instructions in the User's Manual).

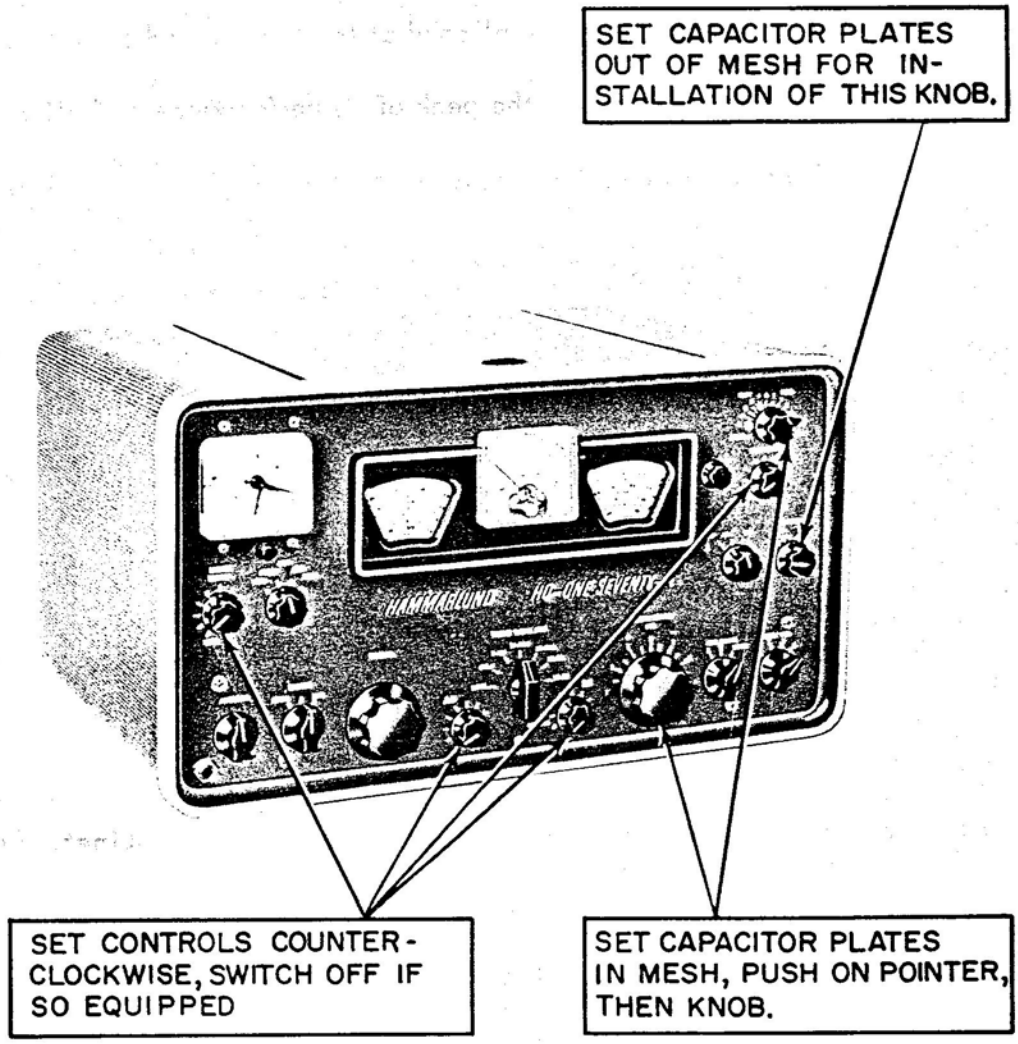
Set the dial calibrator so that the hairline is in line with the mark on the top of the opening in the dial escutcheon.

Noting that the tuning capacitor plates are in the correct position for the low end of the band (fully meshed), tune for zero beat, ignoring the dial frequency setting.

Loosen the left dial set screw, hold the capacitor pulley to maintain zero beat, then set the dial to exactly 14 MCS. Now tighten the dial set screw again FIRMLY.

Turn the dial to gain access to the other set screw on that dial, and tighten it firmly as well. Repeat the same procedure for the right dial, but using 21 MCS this time.

This completes the dial calibration procedure. Check on other bands; if dial calibration is far out, or not possible to be attained, RF alignment will have to be undertaken.


SET CAPACITOR PLATES OUT OF MESH FOR INSTALLATION OF THIS KNOB.
HAMMARLUND
HQ-ONE-SEVENTY
SET CONTROLS COUNTER-CLOCKWISE, SWITCH OFF IF SO EQUIPPED
SET CAPACITOR PLATES IN MESH, PUSH ON POINTER, THEN KNOB.

KNOB ALIGNMENT POSITIONS - REMAINING SHAFTS HAVE FLATS IF KNOB ALIGNMENT IS REQUIRED.

REPLACING POINTERS AND KNOBS

STEP II

Alignment Procedure

This Receiver has been carefully aligned at the factory and should never require any more than a touch-up to retain the peak of its performance. If alignment is necessary, follow the instructions provided below with care.

For the alignment procedure, the equipment listed is required:

Non-metallic alignment tools, general Cement #5097 and #8282, or equivalents.

DC Vacuum-tube Voltmeter.

Signal Generator(s) capable of accurately producing unmodulated signals of: 60 KCS, 455 KCS, 3035 KCS, and RF ranging from 1.8 MCS to 54.0 MCS.

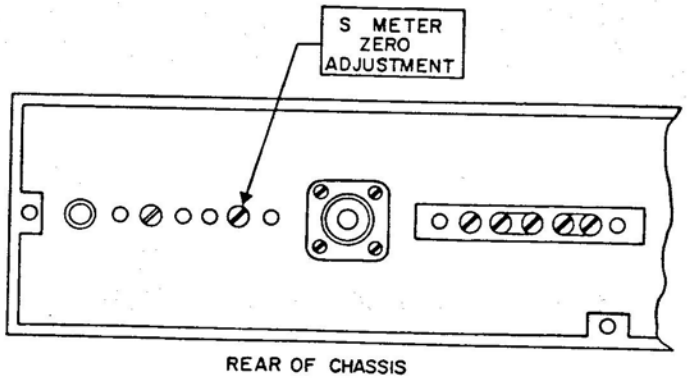
Alignment must be undertaken with the Receiver out of its cabinet. Remove the chassis from the cabinet as instructed in this Manual. When removed, set the chassis on its end with the power transformer down nearest the table top. This is to permit access to both the top and bottom of the chassis.

Before operating the Receiver, adjust the "S" meter pointer screw on the front face of the meter to set the needle exactly over the zero mark on the scale.

Connect the speaker to the Receiver, plug the set into a source of power, and turn it on.

BEFORE ALIGNMENT, THE RECEIVER MUST BE ALLOWED TO WARM UP FOR AT LEAST A HALF HOUR. This is to assure frequency stability.

After warm-up, set the RF gain control fully counterclockwise without actually turning the set off, and adjust the meter zero control at the rear of the Receiver chassis again for zero on the scale. The AVC switch must be set to a position other than "OFF" for the meter to read.



Set all of the front panel controls as shown in the illustration at the start of the alignment procedure. Changes to these settings will be required as the alignment progresses.

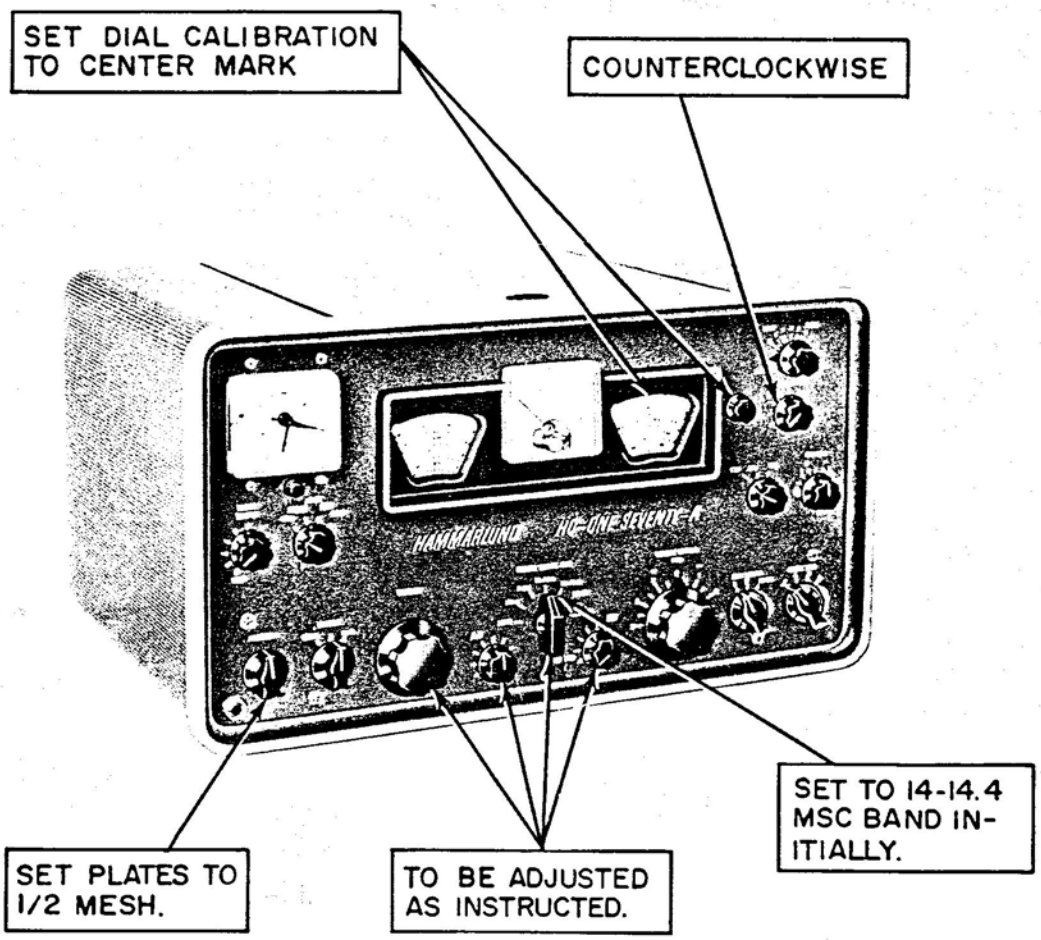
Except where noted in the diagrams, the coil slugs are set from the top of the can. Be careful that you are actually turning the proper slug; it is sometimes easy to be adjusting the wrong one, or even to be turning both at once if they happen to be close together inside the coil.

IF ALIGNMENT

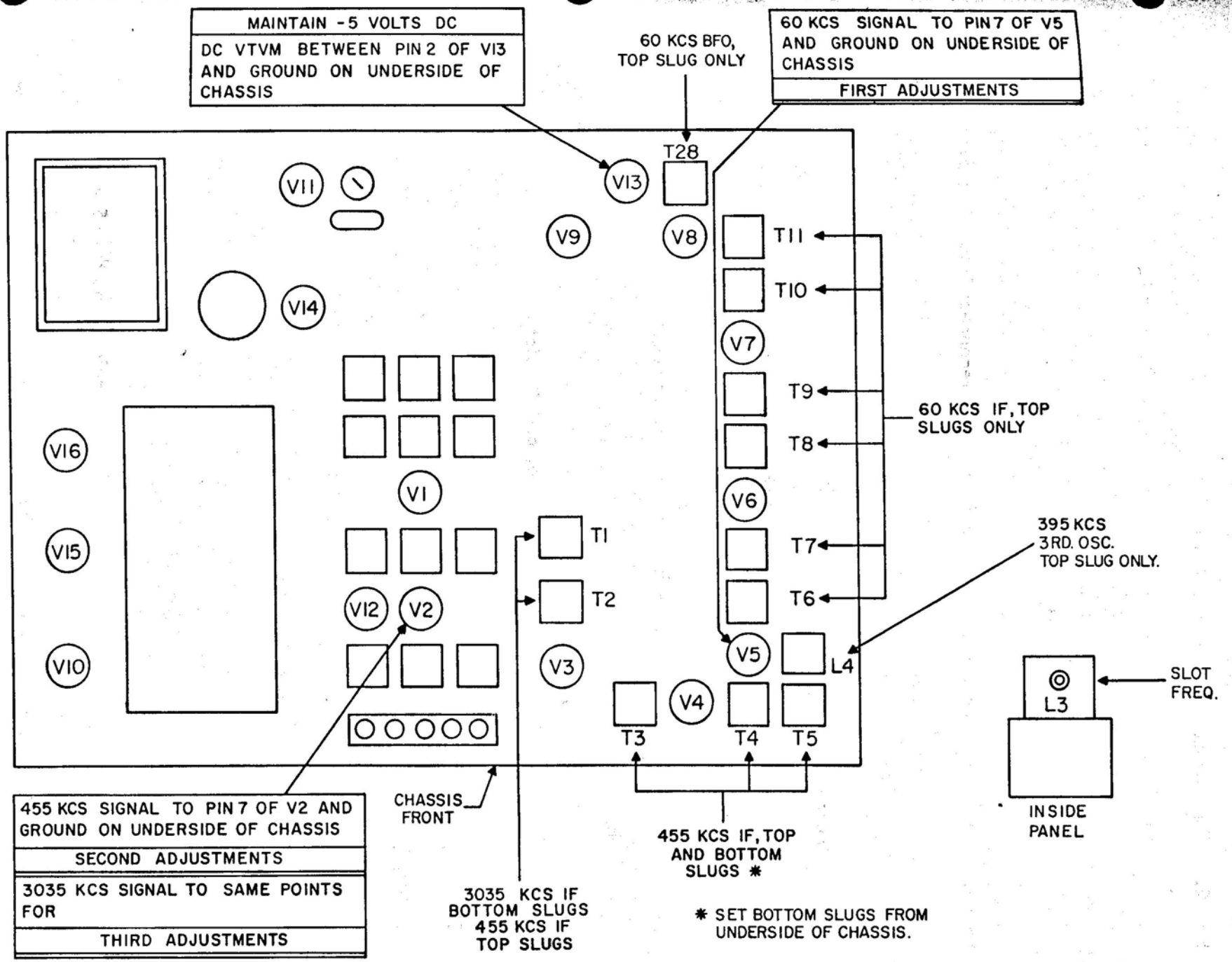
Step 1. Connect the VTVM as required in the illustration.

Connect the Signal Generator for the 60 KCS First Adjustments.

Apply an unmodulated 60 KCS, and set T6, T7, T8, T9, T10, and T11 for a peak reading. Remember to reduce the IF input signal level as necessary to maintain about -5 volts.



CONTROL SETTING AT START OF ALIGNMENT



FIRST, SECOND & THIRD IF ADJUSTMENTS

STEPS 1 TO 9

Step 2. Turn the mode switch from AM to CW.

Check that the BFO is set to zero, then adjust T28 for zero beat as heard in the loud speaker.

Return the switch to AM.

Step 3. Disconnect the Signal Generator from V5 and reconnect it to V2 as shown in the illustration.

Apply an unmodulated 455 KCS, and turn the Band Selector to the 3.5-4.0 MCS band.

Set L4, the top and bottom slugs of T5, T4, and T3, and the top slugs of T2 and T1, for a peak reading.

Remember to reduce the IF input signal level as necessary to maintain about -5 volts.

Step 4. Turn the Slot Frequency control to zero, and the Slot Depth control to its mid-position.

Set L3 for minimum meter reading. It may be necessary to raise the IF input level to be sure of indicating the absolute minimum.

Return the generator level and the Slot Frequency and Depth controls to their previous conditions.

Step 5. Apply an unmodulated 3035 KCS, and turn the Band Switch to the 14.0-14.4 MCS band.

Set the bottom slugs for a peak reading, again maintaining the -5 volts.

This completes the IF alignment procedure. For RF alignment continue with Step 6 below.

RF ALIGNMENT

Step 6. Retain the VTVM connected as before.

Connect the Signal Generator to the antenna terminal strip with both links closed.

Check that all the controls are set as in the diagram with the exception of:

Selectivity to 3 KCS

Side bands to Both

Check that the dial cord, the dial drive, and the tuning knobs are properly operating and tight. Repair if required.

Check that the dial calibration is set to the center mark.

Step 7. The RF alignment is now undertaken. All coil and trim adjustments are made to produce a maximum VTVM reading. As the alignment progresses, remember to reduce the RF Gain to maintain the -5 volts; this is to prevent overloading of the Receiver stages, resulting in incorrect tuned circuit peaking.

Follow the order of adjustment shown in the following chart: start with the top line of 50-54 MCS, and work each line from left to right, Osc., RF, and Ant. in that order.

The Osc. and RF adjustments will interact to some extent; repeat each in turn, ending with the RF Trim as the last.

NOTE: The oscillator frequency is on the high side of the incoming frequency on all the bands except 50-54 MCS. If two points on an oscillator setting appear, the furthest counterclockwise is the correct one for the lower bands. The furthest clockwise is correct for 50-54 MCS.

ANT COIL
T18*
-
T17
-
T16
-
T15
-
T14
-
T13
-
T12
-

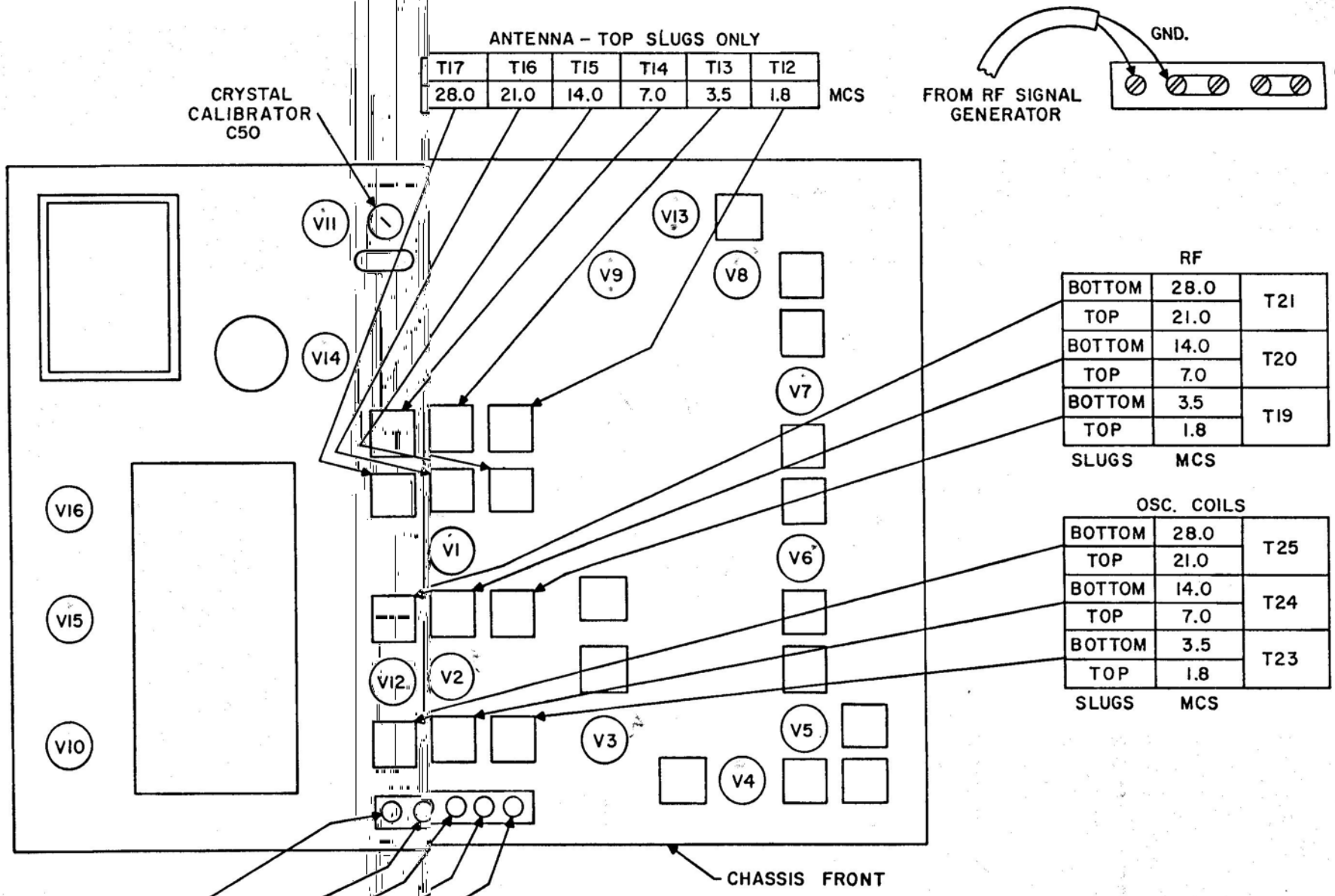
SETTINGS IN MCS			RECEIVER ADJUSTMENTS			
RECEIVER		GENERATOR	OSC	OSC	RF	RF
BAND	TUNE TO	SET TO	COIL	TRIM	COIL	TRIM
50-54	50	50	T26	-	T22	-
50-54	54	54	-	C65	-	C59
28-30	28	28	T25(B)	-	T21(B)	-
28-30	30	30	-	C64	-	C58
21-21.6	21	21	T25(T)	-	T21(T)	-
21-21.6	21.6	21.6	-	C70	-	C57
14-14.4	14	14	T24(B)	-	T20(B)	-
14-14.4	14.4	14.4	-	C63	-	C56
7-7.3	7	7	T24(T)	-	T20(T)	-
7-7.3	7.3	7.3	-	C68	-	C55
3.5-4	3.5	3.5	T23(B)	-	T19(B)	-
3.5-4	4	4	-	C74	-	C54
1.8-2	1.8	1.8	T23(T)	-	T19(T)	-
1.8-2	2	2	-	C62	-	C53

Frequencies are in MCS.

(B) = Bottom Slug, (T) = Top Slug.

* Does not usually require adjustment; squeeze coils together to lower frequency, spr
raise.

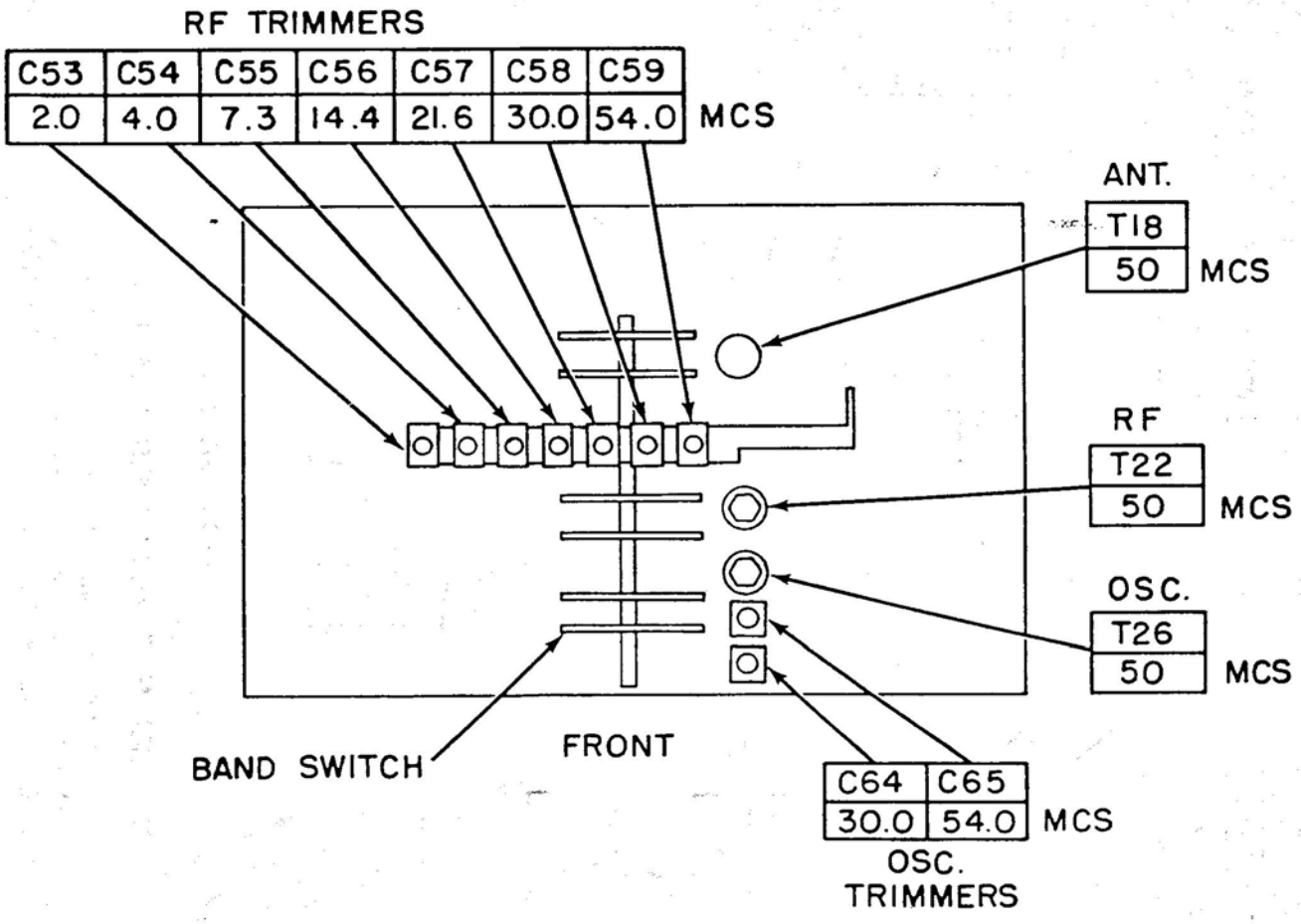
Consult the RF alignment chassis views for the location of each of the adjustment poi
the above chart.



RF ALIGNMENT ADJUSTMENTS – TOP OF CHASSIS

VTVM CONNECTED AS FOR IF – RF SIGNAL GENERATOR TO ANTENNA TERMINAL STRIP, ALL LINKS CONNECTED. SET TO ABOVE FREQUENCIES AS INSTRUCTED IN TEXT.

STEP 7



RF ALIGNMENT ADJUSTMENTS -

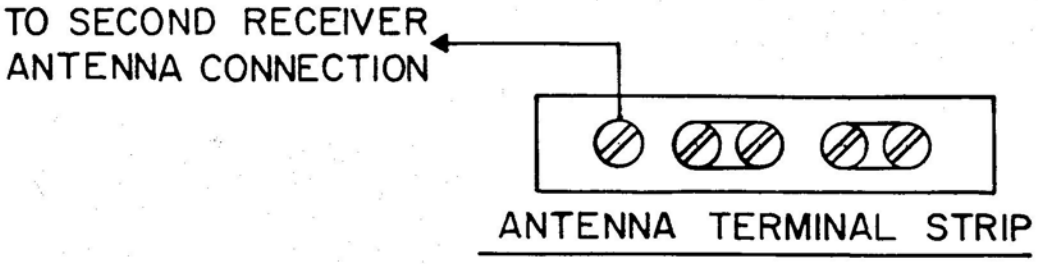
UNDER CHASSIS

STEP 7

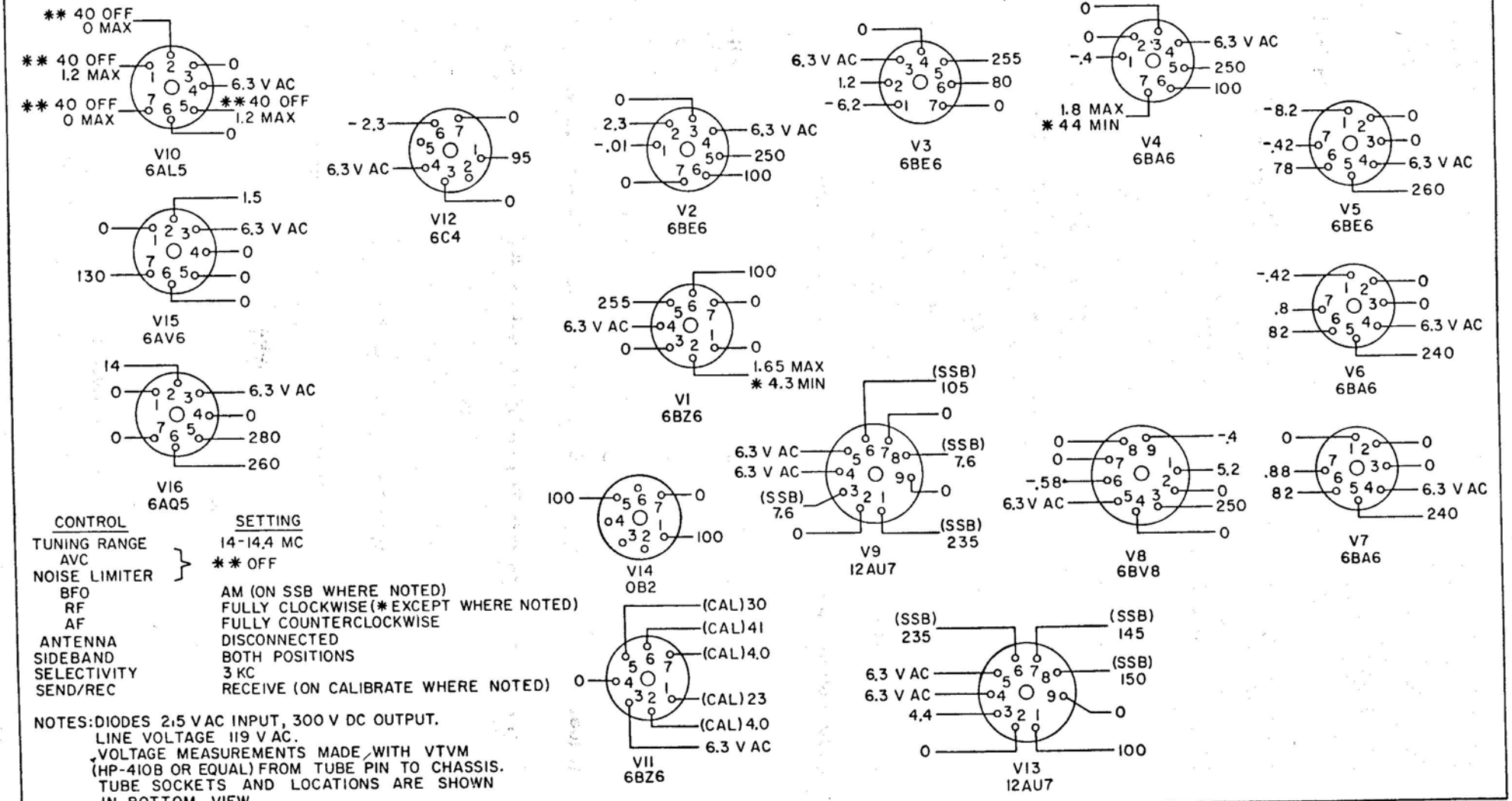
Step 8. On the 50-54 MCS band, reinserting the chassis in the cabinet causes a slight shift in Receiver oscillator frequency. Set the oscillator coil T26 with the Receiver tuned to 50.05 on the dial, 50 MCS applied from the generator. After all alignment is completed, place the chassis in the cabinet or on a metal plate that will cover the entire open chassis, and check that the 50-MCS signal tunes in to 50 MCS on the dial. If it does not, alternately readjust T26 and place the receiver on the metal until it does.

Step 9. The crystal calibrator is factory adjusted to zero beat with the National Bureau of Standards radio signal coming from WWV. If adjustment is determined to be necessary, another receiver capable of receiving WWV on any one of its operating frequencies is required. The HQ-170-A does not tune WWV frequencies. Set the Send-Receive-Calibrate switch to Calibrate.

To set the calibrator, connect a wire from the isolated antenna terminal of the HQ-170-A to the antenna terminal of the second receiver. Tune in WWV on this receiver. Set the HQ-170-A calibrator adjustment C50 for zero beat.



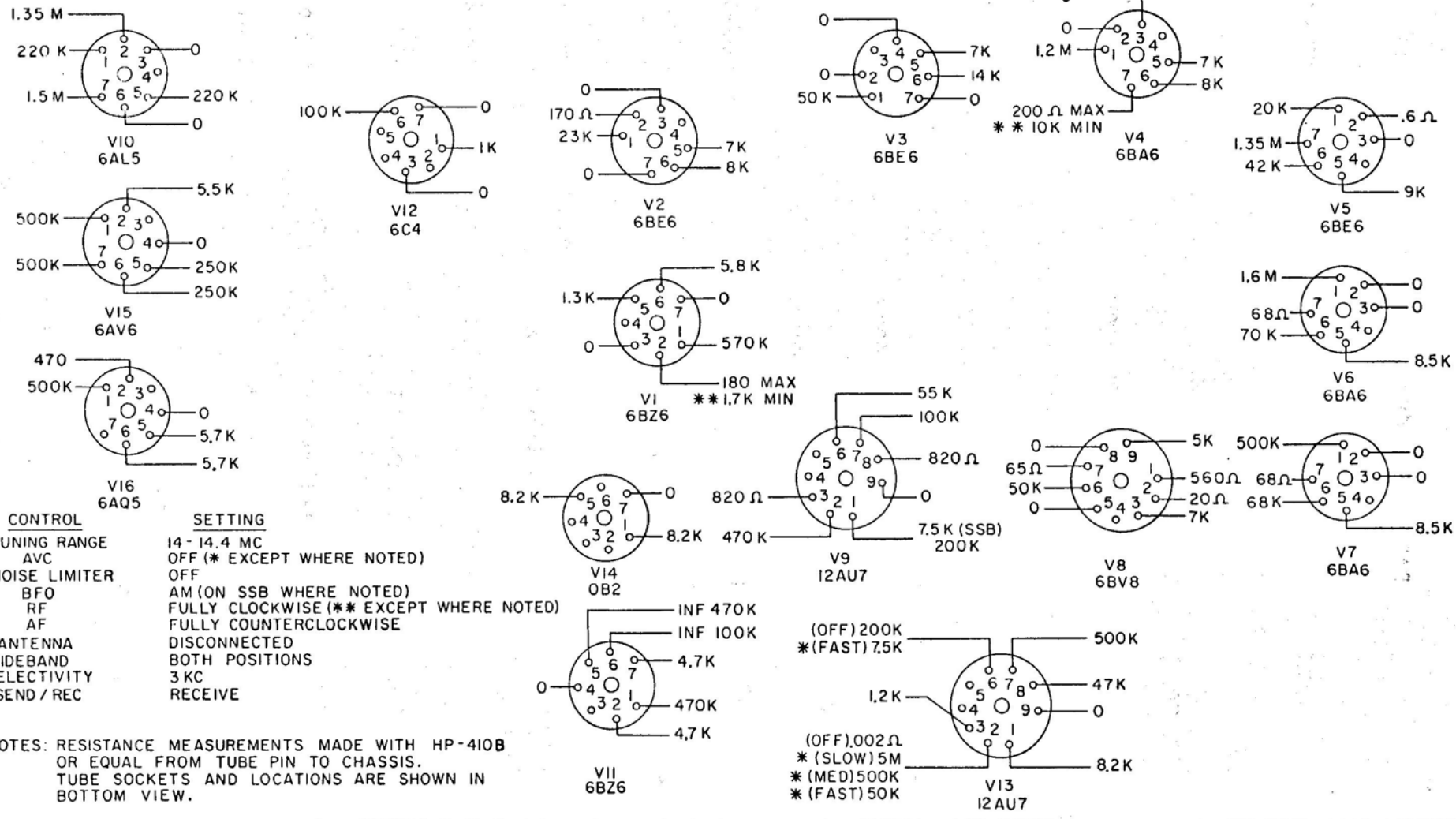
This completes the RF alignment procedure. Return the chassis to the cabinet as instructed in this Manual.



CONTROL	SETTING
TUNING RANGE	14-14.4 MC
AVC	** OFF
NOISE LIMITER	** OFF
BFO	AM (ON SSB WHERE NOTED)
RF	FULLY CLOCKWISE (* EXCEPT WHERE NOTED)
AF	FULLY COUNTERCLOCKWISE
ANTENNA	DISCONNECTED
SIDEBAND	BOTH POSITIONS
SELECTIVITY	3 KC
SEND/REC	RECEIVE (ON CALIBRATE WHERE NOTED)

NOTES: DIODES 2.5 V AC INPUT, 300 V DC OUTPUT.
LINE VOLTAGE 119 V AC.
VOLTAGE MEASUREMENTS MADE WITH VTVM (HP-410B OR EQUAL) FROM TUBE PIN TO CHASSIS.
TUBE SOCKETS AND LOCATIONS ARE SHOWN IN BOTTOM VIEW.

TUBE SOCKET VOLTAGES



CONTROL	SETTING
TUNING RANGE	14 - 14.4 MC
AVC	OFF (* EXCEPT WHERE NOTED)
NOISE LIMITER	OFF
BFO	AM (ON SSB WHERE NOTED)
RF	FULLY CLOCKWISE (** EXCEPT WHERE NOTED)
AF	FULLY COUNTERCLOCKWISE
ANTENNA	DISCONNECTED
SIDEBAND	BOTH POSITIONS
SELECTIVITY	3 KC
SEND / REC	RECEIVE

NOTES: RESISTANCE MEASUREMENTS MADE WITH HP-410B OR EQUAL FROM TUBE PIN TO CHASSIS.
TUBE SOCKETS AND LOCATIONS ARE SHOWN IN BOTTOM VIEW.

TUBE SOCKET RESISTANCES

PARTS LIST HQ-170A

SCHEMATIC DESIGNATION	DESCRIPTION	PART NO.
	CAPACITORS	
C1	Assy	T41604-G5
C2, C4, C5, C6, C7, C9, C10, C11, C15, C17, C18, C21, C23, C32, C41, C47, C81, C124, C130, C133, C141, C145, C146	Disc Ceramic .01 MFD +80-20%, 600V	M23034-19
C3, C8	Temp. Comp. N750, 110 MMF, 1000V	K23010-5
C12, C33, C36, C38, C40, C46, C136, C137	Disc Ceramic .02 MFD +80-20%, 600V	M23034-9
C13, C89, C97, C111, C113, C120, C123	Dur-Mica DM-15 20 MMF ±.5 MMF, 500 V	K23006-17
C14	Dur-Mica DM-19 560 MMF ±5%, 500V	K23027-6
C16, C28, C93, C101, C103, C114	Dur-mica DM-15 3 MMF ±.5MMF, 500V	K23006-18
C19, C20	Disc Ceramic .04 MFD +80-20%, 600V	M23034-12
C22, C27	Disc Ceramic .01 MFD ±10%, 1000V	M23034-25
C29	Dur-Mica DM-15 780 MMF ± 5%, 300V	K23006-39
C30	Variable (Pass Band)	K42040-2
C31, C51	Dur-Mica DM-15 100 MMF ±10%, 500V	K23006-1
C34, C37	Dur-Mica DM-15 24 MMF ± 10%, 500V	K23006-7
C35	Temp. Comp. N750, 330 MMF, 1000V	K23010-9

PARTS LIST HQ-170A

SCHEMATIC DESIGNATION	DESCRIPTION	PART NO.
	CAPACITORS (cont'd)	
C39, C42	Disc Ceramic .0005 MFD ±10%, 1000V	M23034-13
C43, C152	Dur-Mica DM-15 10 MMF ± 10%, 500V	K23006-8
C44, C45	Disc Ceramic .002 MFD GMV, 1000V	M23034-18
C48, C87, C131	Dur-Paper .1 MFD ±20%, 200V	K23045-3
C49, C95, C105	Dur-Paper .047 MFD ±20%, 400V	K23045-2
C50	Var. Trimmer 8-50 MMF, N750	K23038-5
C52	Assy.	K34454-G24
C53, C54	Mica Trimmer 3-35 MMF	K23043-5
C55, C56, C57, C58, C59	Mica Trimmer 1.15-20 MMF	K23043-6
C61	Dur-Mica DM-15 24 MMF ± .5 MMF, 500V	K23006-48
C62, C63, C68, C70, C74	Trimmer 1-8 MMF	K23008-2
C64, C65	Rotary Trimmer 1.5-9.1 MMF	K23057-1
C66	Temp. Comp. 4.7 MMF, N750	K23010-6
C67, C69	Dur-Mica DM-15 62 MMF ± 2%, 500V	K23006-10
C71	Dur-Mica DM-15 243 MMF ± 5%, 300V	K23006-27

PARTS LIST HQ-170A

SCHEMATIC DESIGNATION	DESCRIPTION	PART NO.
	CAPACITORS (cont'd)	
C72, C76	Temp. Comp. 27 MMF, N470	K23010-26
C73	Temp. Comp. 20 MMF, N470	K23010-23
C75, C140	Dur-Mica DM-15 12 MMF ± 5%, 500V	K23006-94
C77, C78, C143, C144	Dur-Mica DM-15 47 MMF ± .5MMF, 300V	K23006-47
C79	Temp. Comp. 618 MMF, N470	K23010-13
C80	Temp. Comp. N470, 4.7 MMF, 1000V	K23010-8
C82	Electrolytic 60 - 40 - 40 - 40	K15504-71
C82A	60 MFD, 400V	(Part of C82)
C82B	40 MFD, 400V	(Part of C82)
C82C	40 MFD, 350V	(Part of C82)
C82D	40 MFD, 25V	(Part of C82)
C83, C84	Disc Ceramic .01 MFD, GMV, 1400V	M23034-26
C85	Dur-Paper .1 MFD ±20%, 600V	K23045-5
C86, C94	Dur-Mica DM-15 31 MMF, 500V	K23006-15
C88, C90, C96, C98	Dur-Mica DM-15 29 MMF, 500V	K23006-16
C91, C99	Dur-Mica DM-15 28 MMF, 500V	K23006-19
C92, C100	Dur-Mica DM-15 27 MMF, 500V	K23006-20

PARTS LIST HQ-170A

SCHEMATIC DESCRIPTION	DESCRIPTION	PART NO.
	CAPACITORS (cont'd)	
C104, C110, C115, C117, C122	Dur-Mica DM-15 7 MMF, 500V	K23006-24
C106	Dur-Mica DM-15 10 MMF, 500V	K23006-22
C107, C116	Dur-Mica DM-15 14 MMF, 500V	K23006-25
C108, C119	Dur-Mica DM-15 21 MMF, 500V	K23006-26
C112, C121	Dur-Mica DM-15 16 MMF, 500V	K23006-23
C125	Dur-Mica DM-15 47 MMF ±10%, 500V	K23006-6
C126, C127	Mylar .01 MFD ±10%, 400V	K23044-2
C129	Variable 98.5 MMF (BFO)	K42042-1
C132	Disc Ceramic .005 MFD, GMV, 1000V	M23034-10
C134	Dur-Mica DM-15 2 MMF ± .5 MMF, 500V	K23006-37
C135	Disc Ceramic 8 MMF ±20%, 1000V	M23034-11
C138	Temp. Comp. N750, 47 MMF, 500V	K23061-26J
C139	Capacitor Temp. Comp. 10 MMF, N470	K23010-45
C142	Temp. Comp. 12 MMF, N470	K23010-10
C147	Electrolytic 20 MFD, 25V	M23091-1

PARTS LIST HQ-170A

SCHEMATIC DESIGNATION	DESCRIPTION	PART NO.
	CAPACITORS (cont'd)	
C102, C109, C118, C148,) C149, C150)	Dur-MICA DM-15 9 MMF ± .5 MMF, 500V	K23006-21
C151, C154, C155, C156	Disc Ceramic .001 MFD, GMV, 500V	M23034-30
C153	Dur-Mica DM-15 47 MMF ± 2%, 500V	K23006-105
CR1, CR2	Rectifier, Silicon (CER 72C)	M41215-3
E1	Fuse Holder	K15923-1
F1	Fuse, 3 Amp Type 3AGC for 50-60 Cycles 115V Operation	K15928-8
F1	Fuse, 1-1/2 Amp Type 3 AGC for 50-60 Cycles 230V Operation	K15928-1
I1	Lamp, Incandescent #47	K16004-1
I2	Lamp, Incandescent #47	K16004-1
I3	Lamp, Incandescent #47	K16004-1
J1	Socket (8 Pin)	K16083-1
J2	Phone Jack	K35608-1
J3	Connector, Female	K41138-1
J4	Connector, Receptacle (Antenna)	K16111-1
J5, J6	Connector, Female	K41144-1
L1	RF Choke, 2.5 MH	K15627-1
L2	Bifilar Coil	K42032-1
L4	Passband Tuning Coil	K26301-1
L5, L7, L10	Inductor, 330 MH	K42019-1
L6	Reactor	K26302-1
L8	RF Choke, 38 Microhenry	K15629-1
L9	RF Choke, 240 Microhenry	K15629-2
M1	Meter "Signal strength"	K26149-5

PARTS LIST HQ-170A

SCHEMATIC DESIGNATION	DESCRIPTION	PART NO.
	RESISTORS	
R1, R30, R32, R37, R46,) R76, R82, R85, R93, R99)	470K ±10%, 1/2W	K19309-113
R2, R13, R27, R40, R51, R74	100K ±10%, 1/2W	K19309-97
R3, R4	10Ω±10%, 1/2W	K19309-1
R5, R14	180Ω±5%, 1/2W	K19309-260
R6	Variable, 1.5K Dual With R15 and S3, RF Sens.	K38940-1
R7, R29	22K ±10%, 1/2W	K19309-81
R8, R98	160Ω±5%, 1/2W	K19309-199
R9, R12, R16, R17, R47,) R52, R62, R97)	1K ±10%, 1/2W	K19309-49
R10, R42, R49, R65, R70,) R72, R73, R75, R84)	47K ±10%, 1/2W	K19309-89
R11	4.3K ±5%, 1/2W	K19309-213
R15	Variable, 10K, RF Sens.	(Part of R6)
R18, R103	100K ±10%, 1W	K19310-97
R19	Variable, 1.5K (Sens. Adj.)	K15379-2
R20	Variable, 300 (Zero Adj.)	K15379-1
R21	22K ±10%, 1W	K19310-81
R22	820Ω±5%, 1/2W	K19309-266
R23, R41, R95	10K ±10%, 1/2W	K19309-73
R24	120Ω±5%, 1/2W	K19309-258
R25	39Ω ± 5%, 1/2W	K19309-253

PARTS LIST HQ-170A

SCHEMATIC DESIGNATION	DESCRIPTION	PART NO.
	RESISTORS (cont'd)	
R26	Variable, 200 Ω (Slot Depth)	K15368-7
R28, R43, R45, R48, R68, R71	220K, ±10%, 1/2W	K19309-105
R31, R33	68 Ω ±10%, 1/2W	K19309-21
R34	560 Ω ±10%, 1/2W	K19309-43
R35	1K ±10%, 1W	K19310-49
R39	820 Ω ±10%, 1/2W	K19309-47
R44, R102	1 MEG ±10%, 1/2W	K19309-121
R53	3K ±10%, 10W	K19337-2
R54	680 Ω ±10%, 1/2W	K19309-45
R55	3K ±5%, 1/2W	K19309-212
R56	15K ±10%, 1/2W	K19309-77
R57	6.8K ±10%, 1/2W	K19309-69
R58	27K ±10%, 2W	K19304-52
R59, R63, R69	2.2K ±10%, 1/2W	K19309-57
R60, R61, R66, R67	330K ±10%, 1/2W	K19309-109
R64	270 Ω ±10%, 1/2W	K19309-35
R77	27 Ω ±10%, 1/2W	K19309-11
R78	Variable 500K (Noise Limiter) Includes S1	K15378-3
R79	Variable 1 MEG (Audio Gain)	K26218-3
R80	180 Ω ±10%, 1/2W	K19309-31
R81	1.5K ±10%, 1W	K19310-53

PARTS LIST HQ-170A

SCHEMATIC DESIGNATION	DESCRIPTION	PART NO.
	RESISTORS (cont'd)	
R83	4.7 MEG ±10%, 1/2W	K19309-137
R86	430Λ ±5%, 1W	K19310-212
R87	470Λ ±10%, 1/2W	K19309-41
R88	2.7K ±5%, 1/2W	K19309-272
R89	3.6K ±5%, 1/2W	K19309-179
R90	6.2K ±5%, 1/2W	K19309-176
R91	11K ±5%, 1/2W	K19309-215
R92	5.6K ±10%, 1/2W	K19309-67
R94	68Λ ±5%, 1/2W	K19309-256
R96	4.7K ±10%, 1/2W	K19309-65
R100	22Λ ±10%, 1W	K19310-9
R101	2.2 MEG ±10%, 1/2W	K19309-129
S1	Switch SPDT (Noise Limiter)	Part of R78
S2A	Switch Wafer (Ant. Primary)	K38952-1
S2B, C	Switch Wafer (Ant. Sec. RF Sec.)	K38952-2
S2D	Switch Wafer (RF Tap)	K38952-3
S2E, F	Switch Wafer Osc. (HF Osc. Tank, HF Osc. Top)	M39073-1
S3	Switch SPST (On-Off Line)	Part of R6 and R15
S4	Switch (Send-Rec.-Calibrate)	K26306-1
S5	Switch (Selectivity)	M26296-1
S6	Switch (Sideband)	M26303-1
S7	Switch (AM-SSB-CW)	K39225-1
S8	Switch (AVC)	K26309-2

PARTS LIST HQ-170A

SCHEMATIC DESIGNATION	DESCRIPTION	PART NO.
T1, T2	IF Transformer, 3035 & 455KC	M26402-2
T3	IF Transformer, 455 KC	K38829-2
T4, T5	IF Transformer, 455 KC	K38946-1
T6, T7, T8, T9, T10, T11	60 KC Coil Assy.	M42005-1
T12	Antenna Coil Assy. (Band 1)	K38926-1
T13	Antenna Coil Assy. (Band 2)	K38927-1
T14	Antenna Coil Assy. (Band 3)	K38928-1
T15	Antenna Coil Assy. (Band 4)	K38929-1
T16	Antenna Coil Assy. (Band 5)	K38930-1
T17	Antenna Coil Assy. (Band 6)	K38931-1
T18	Antenna Coil (Band 7)	K26338-1
T19	RF Coil Assy. (Bands 1 & 2)	K38932-1
T20	RF Coil Assy. (Bands 3 & 4)	K38933-1
T21	RF Coil Assy. (Bands 5 & 6)	K38934-1
T22	RF Coil (Band 7)	K38944-2
T23	Osc. Coil Assy. (Bands 1 & 2)	K38935-2
T24	Osc. Coil Assy. (Bands 3 & 4)	K38936-2
T25	Osc. Coil Assy. (Bands 5 & 6)	K38937-2
T26	Oscillator Coil (Band 7)	K38945-3
T27	Power Transformer for 50-60 Cycles 115V Operation	K26305-3
T27	Power Transformer for 50-60 Cycles 115/230V Operation	K26305-4
T28	60 KC Coil Assy.	M42005-4

PARTS LIST HQ-170A

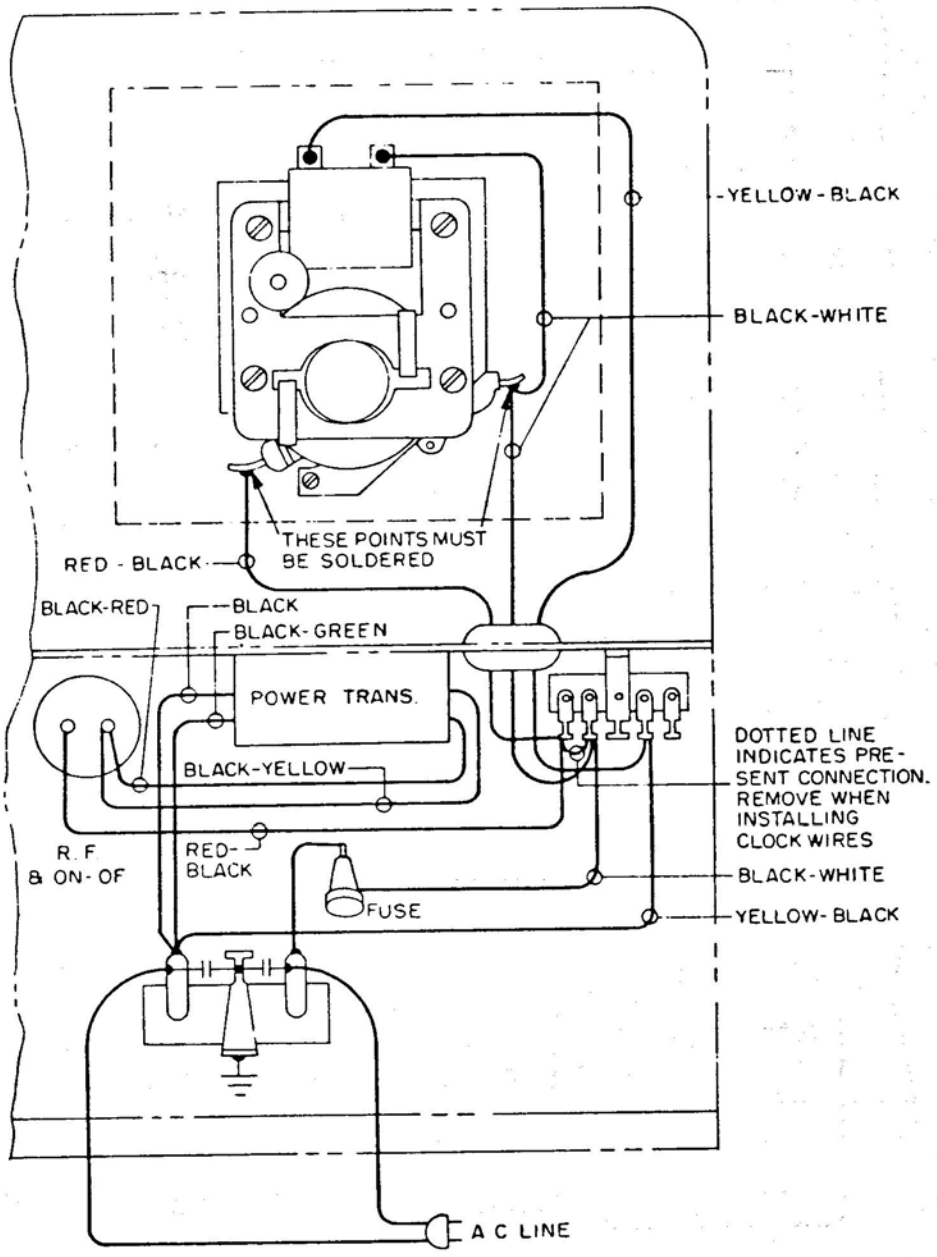
SCHEMATIC DESIGNATION	DESCRIPTION	PART NO.
T29	Output Transformer	K38828-2
T30	Filament Transformer for 50-60 Cycles, 115V Operation	K39224-1
T30	Filament Transformer for 50-60 Cycles, 115/230V Operation	K39224-2
V1, V11	Tube, Electron, 6BZ6	K16388-1
V2, V3, V5	Tube, Electron, 6BE6	K16284-1
V4, V6, V7	Tube, Electron, 6BA6	K16283-1
V8	Tube, Electron, 6BV8	K16396-1
V9, V13	Tube, Electron, 12AU7	K16295-1
V10	Tube, Electron, 6AL5	K16294-1
V12	Tube, Electron, 6C4	K16288-1
V14	Tube, Electron, OB2	K16375-1
V15	Tube, Electron, 6AV6	K16392-1
V16	Tube, Electron, 6AQ5	K16387-1
Y1	Crystal, 2580KC	K38972-2
Y2	Crystal, 100KC	K38661-1
Z1	RC Printed Network	K38981-1
Z2	RC Printed Network	K38846-1

MISCELLANEOUS PARTS

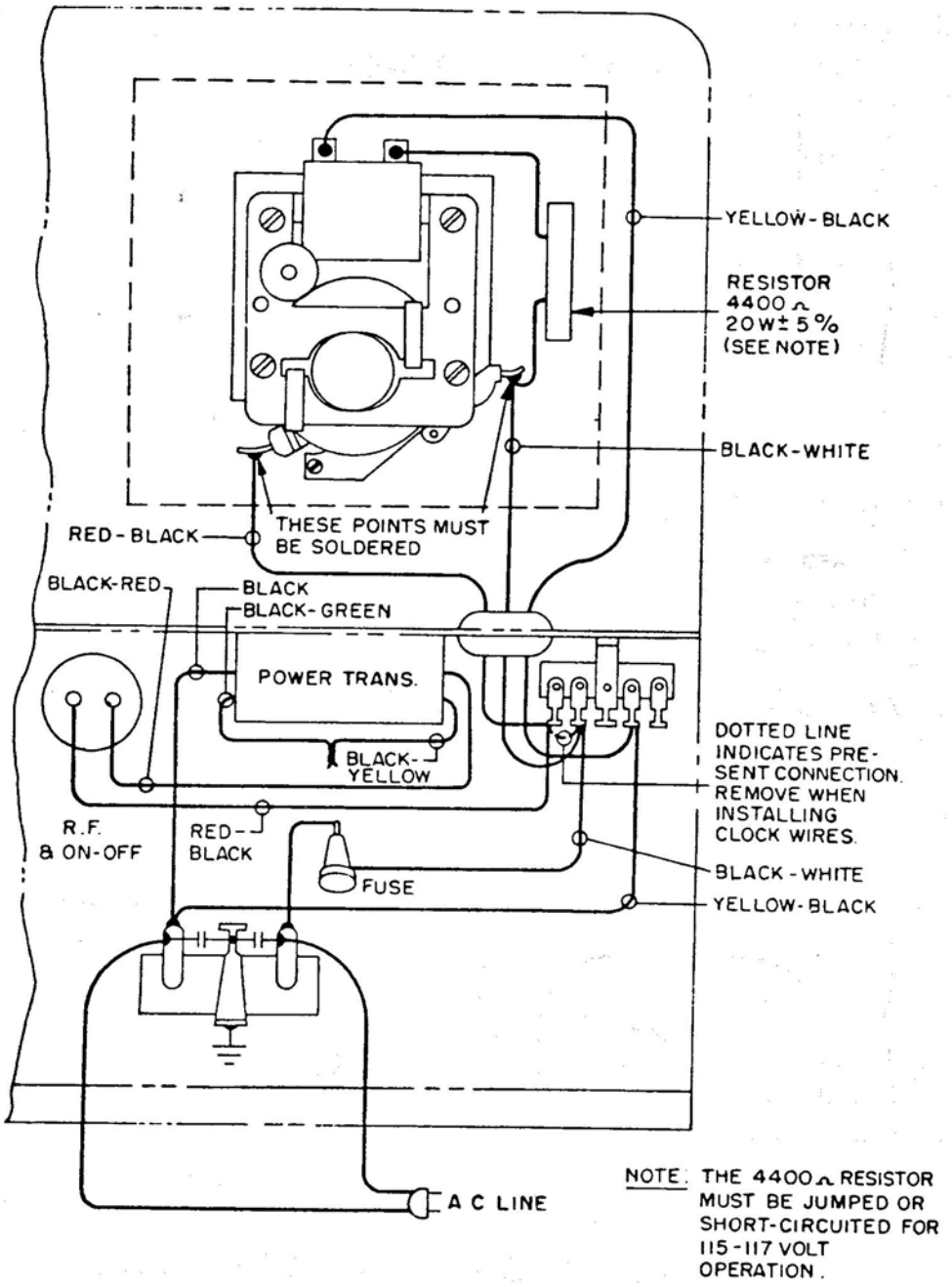
DESCRIPTION	PART NO.
Snap Button	K29619-9
Sems Fastener, #10 - 32 x 5/8 Lg.	K10004 -60
Metal Washer, 13/64 I.D. x 13/32 O.D. x .040 Thk.	K10007-243
Instruction Book	K52757-2
Steel Cable Assy.	K26339-G1
Tension Spring for Steel Cable Assy.	K38895-1
Knob (1" Dia.) with No Mark	K26224-2
Knob (1" Dia.) with White Mark	K26224-1
Knob (2" Dia.)	K26226-1
Knob (Pointer Type)	K26229-1
Knob, Bar	K26243-1
Knob (3/4" Dia.)	K26216-3
Pointer (Large)	K42043-2
Pointer	K42043-1
Window Assy.	M26300-G2
Window Assy. Retainer Spring	K26273-1
Window Assy. Tension Spring	K26318-1

OPTIONAL ACCESSORIES

DESCRIPTION	PART NO.
24 Hour 115 60 ∽ Telechron Clock Assembly Conversion Kit	PL 26380-G2
24 Hour, 115-230V - 50 ∽ Telechron Clock Assembly Conversion Kit	PL 26380-G3
24 Hour, 115-230V - 60 ∽ Telechron Clock Assembly Conversion Kit	PL 26380-G4
Loudspeaker, Assembly Model S200 in Cabinet Matched to the Models HQ-170A and HQ-180A series of receivers	PL 26394-G1

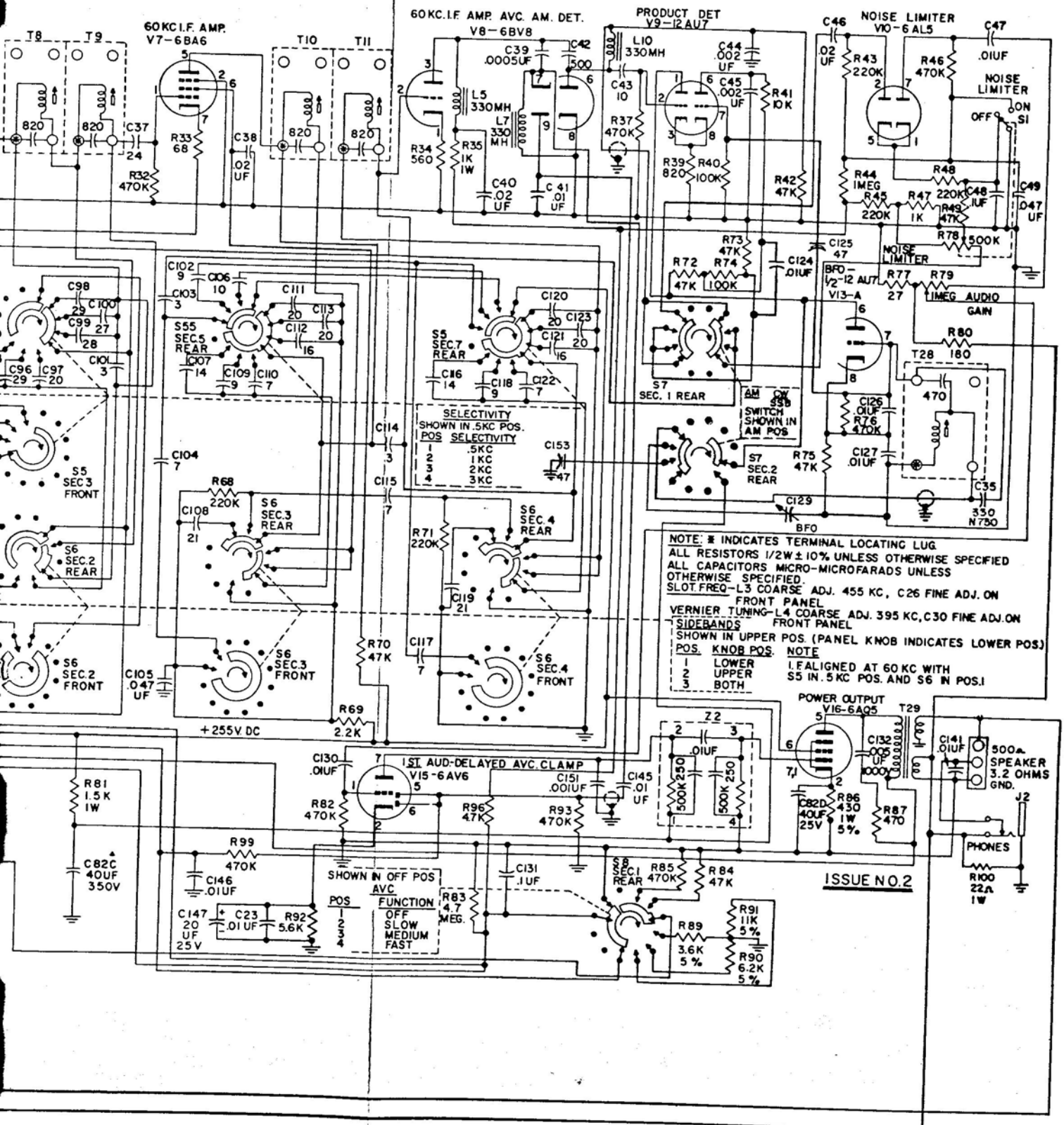


CLOCK INSTALLATION HQ-170A & HQ-180A
115V 50 OR 60 ~

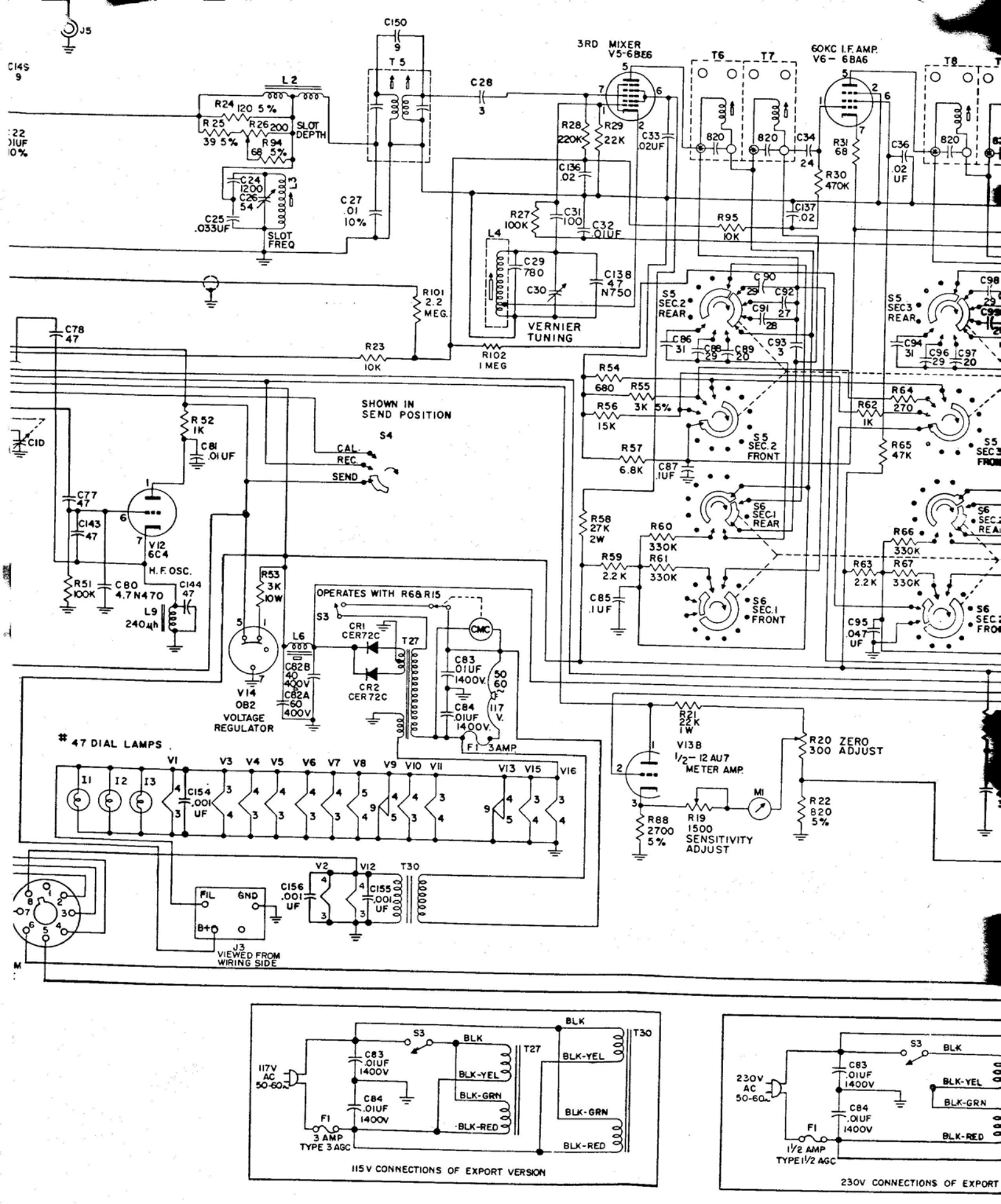


NOTE: THE 4400 Ω RESISTOR MUST BE JUMPED OR SHORT-CIRCUITED FOR 115-117 VOLT OPERATION.

CLOCK INSTALLATION HQ-170A & HQ-180A
230V 50 OR 60 ~

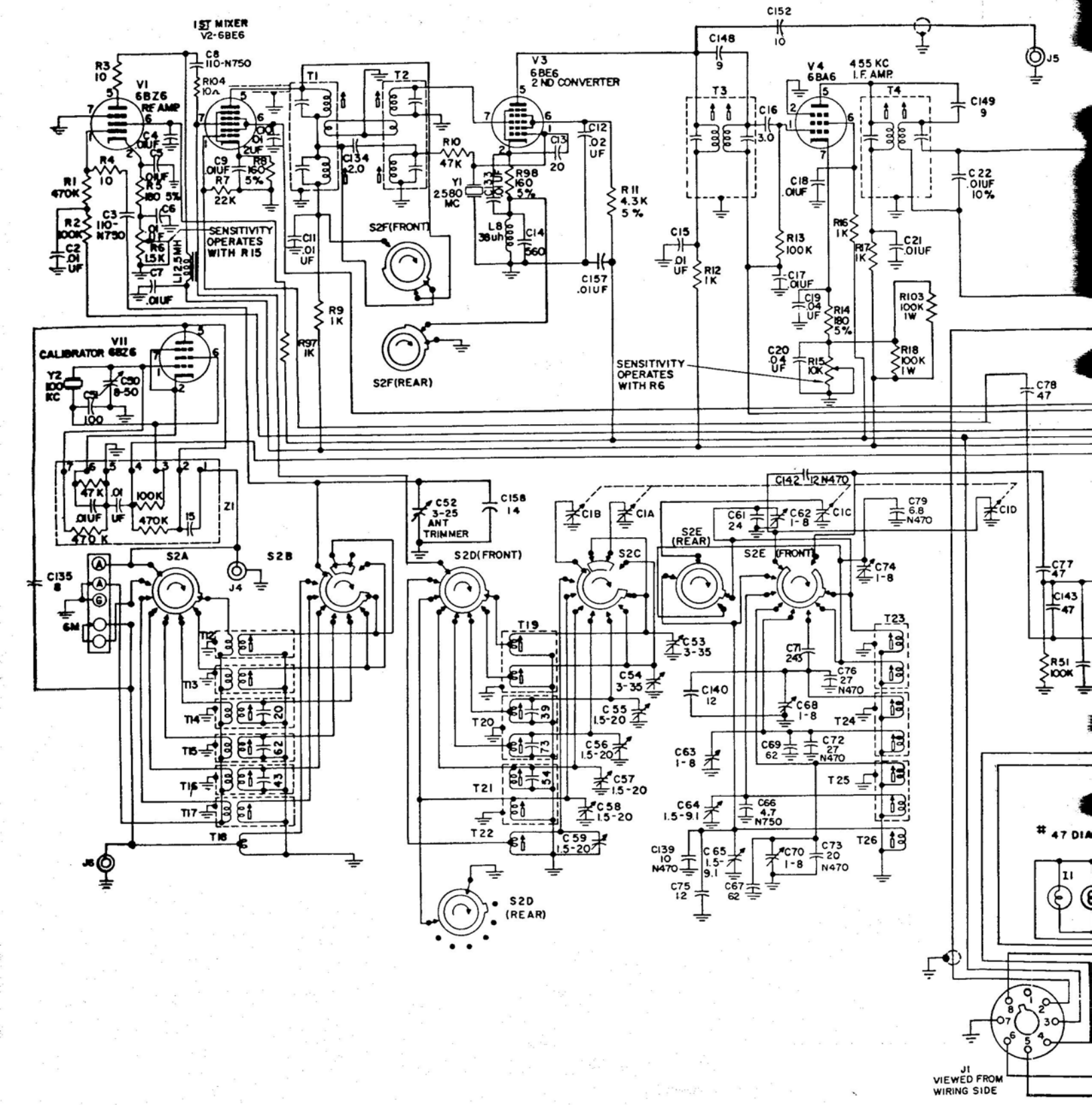


SCHEMATIC DIAGRAM - HQ-170A



115 V CONNECTIONS OF EXPORT VERSION

230V CONNECTIONS OF EXPORT


1ST MIXER
V2-6BE6
V1
6BZ6
RF AMP
V3
6BE6
2ND CONVERTER
V4
6BA6
455 KC
I.F. AMP.
VII
CALIBRATOR 6BZ6
SENSITIVITY
OPERATES
WITH R15
SENSITIVITY
OPERATES
WITH R6
S2F(FRONT)
S2F(REAR)
S2A
S2B
S2C
S2D(FRONT)
S2D
(REAR)
S2E
(REAR)
S2E (FRONT)
C52
3-25
ANT
TRIMMER
J1
VIEWED FROM
WIRING SIDE

be obtained. If it is desirable to increase the headphone volume, an inexpensive line to voice coil transformer is suggested. This transformer is connected backwards with the voice coil connections to headphone plug and the 500 ohm line connections to the phones. The resultant impedance step up will provide higher headphone volume. This procedure should only be resorted to when absolutely necessary such as when a person may be hard of hearing. It should be remembered that as a result of increasing the headphone level any residual hum will also be increased, which the hard of hearing person will not find objectionable, whereas a person with normal hearing may.

VOX CIRCUIT REQUIREMENTS

In the event that the vox circuit in your transmitter may be designed for 500 ohm input and in the event that sufficient gain in this circuit may not be available to provide proper performance from the 3.2 voice coil winding, the matching transformer referred to in the headphone paragraph may be employed. Under these circumstances, the voice coil winding should be connected to the speaker terminals with the 500 ohm line winding to the Vox circuit. Such a matching transformer may also be required or useful for phone patch operation, depending, of course, on the design of the phone patch.

GRID BLOCK BIASING FOR VOX CIRCUITS

Many of the single side band transmitters being produced today provide 100 volts negative bias which is switched from the transmitter to the receiver by the Vox circuit. The Hallicrafter HT 32 transmitter is a good example. As a result of the voice control operating the relay in the transmitter, the 100 volts of negative bias available in the transmitter is made available to silence the receiver. When this type of receiver silencing is desired the relay receptacle on the rear of the HQ-170 is not employed. In order to adapt your HQ-170 for this operation it is suggested that the two leads that are now connected to the relay receptacle be removed and each one taped up so that they are insulated from one another and the chassis. This may be dressed conveniently out of the way. A 5 megohm ½ watt resistor and 15" of insulated shielded lead is now required. One end of the 5 megohm resistor should be connected to pins 5 or 6 or tube socket V16 or the 6AV6. The other end of this resistor is then connected to the inner conductor of the insulated shielded lead with the shield left floating at this point insulated to prevent shorting to the resistor, inner conductor, or any part of the wiring. The other end of this insulated and shielded lead should have the center conductor connected to one or both of the relay terminals with the shield connected to any convenient ground or chassis connection. The bias lead from the Vox circuit is then connected to one or both of the relay receptacle terminals, a standard AC plug may be employed in the relay receptacle. It is now necessary to employ a common ground connection between the HQ-170 chassis and the transmitter chassis in order to complete the biasing circuit. Making changes will result in the 5 megohm resistor being in series with the bias lead to the AVC bus in the HQ-170. The 5 megohm resistor isolates the bias supply and prevents this lead from affecting the AVC circuit. The shielded lead is recommended to prevent RF pickup and is really a precautionary measure. It may also advisable a shielded lead the receiver and the transmitter. This system in no way implies that the antenna changeover relay or a suitable TR switch will not be required. Failure to employ one or the other may result in burning out the antenna coils of the receiver, or other possible damage.

Lab tests indicate that minus 75 volts will silence the receiver when one volt of RF is applied to the antenna terminals. 75 volts negative bias is therefore, the suggested minimum value for complete silencing. The full bias voltage is not applied to the grids due to a voltage division which takes place as a result of the 5 megohm resistor and the other resistors, employed in the AVC system.

DIAL CALIBRATION ACCURACY

Please remember that we do not claim frequency meter accuracy.

Our production tolerance on this receiver is plus or minus « a dial division. This tolerance is necessary as a result of working to printed dial scales. The band edge markers are held to very close tolerance, usually plus or minus the thickness of the dial marker. The total runout or what is often referred to as tracking error, will usually be within the plus or minus « a dial division as previously specified. It is for this reason that the adjustable dial marker and the 100 kc calibrator is provided for the correction factors.

RF FEED BACK

In the event that RF feed back is experienced when the relay terminals on the rear of the HQ-170 are employed, this usually indicates that the relay leads between the receiver and antenna relay are picking up RF. This may be due to the particular lead length or a high standing wave ratio on the antenna system. The solution is of course, to prevent the RF pickup of the relay leads from getting into the receiver. Adding a pair of .01 disc ceramic capacitors from each of the relay terminals to ground will usually eliminate the feed back condition. These extra .01 capacitors

should be installed using as short lead length as possible, and preferably mounted inside of the receiver bypassing each of the relay terminals to ground.

We have recently received a few complaints advising that the slot depth control on the HQ-170 receiver is apparently inoperative. This we can assure you is decidedly not the case, since from all indications, too much is being expected insofar as the effect of this control being very noticeable is concerned.

The slot depth control is actually a very gradual vernier adjustment. In view of this its effect will not be very noticeable unless the proper procedure is employed. The suggested procedure is as follows:

Tune in an AM signal on any band or any other strong constant carrier of similar nature, such as crystal calibrator. Whenever the receiver is being tuned for normal reception be sure to first rotate the slot frequency control to the extreme clockwise or counter clockwise position. In other words, never leave the slot frequency control at or near the zero setting. If this procedure is not followed it is obvious that the center of the pass band will be slotted out, in some cases this being quite obvious by producing 2 spot tuning or 2 peak S meter readings.

After tuning in the constant carrier and peaking the S meter, taking the above precautions, rotate the slot frequency control. It will be noticed that upon approaching the zero setting, the S meter reading will be effected. A very definite null or minimum S meter reading will be obtained with the slot frequency control adjusted at or near zero. Observe this S meter reading. With the slot frequency control set at the minimum S meter reading position, the slot depth control should be rotated very slowly throughout its range, observing the S meter. It will be found that one particular spot throughout the range of the slot depth control a further reduction in the S meter reading will be obtained. Once this setting has been obtained, the slot depth control may be left permanently in this position, and all future slot filter adjustment made by the slot frequency control only. A check of the slot depth control setting may be advisable periodically.

It is hoped that the above information will prove of interest and assistance. If after following the various suggestions, trouble cannot be eliminated, please write to us supplying as much detailed information as possible in order that we may endeavor to be of further assistance or authorize return of the receiver for repair. Please refer to terms of our warranty on the inside rear cover of your instruction manual which will apply under these circumstances.

Erratic performance in the triple conversion bands, such as a temporary loss of gain after a period of transmission or stand-by operation, which is cured by rotating the band change switch or turning the receiver off and then on again, usually involved the second 6BE6 converter of V3 in the schematic diagram. If changing this tube does not permanently cure this condition, changing the value of R10 from 22K to 47K is recommended.

If a new 6BZ6 in the crystal calibrator does not result in improving the output of the crystal calibrator to your liking, additional output may be obtained by increasing the screen voltage, this is accomplished by merely adding an external « watt resistor from 47K to 100K across terminals or leads 3 and 4, of the couplate Z1 in the schematic diagram.

If upon checking the 100 kc calibrator against WWV using another receiver it is not possible to zero beat the calibrator by means of the adjustable trimmer, and the crystal appears to be low in frequency, the frequency of the crystal can be raised by substituting an external 470K « watt resistor, for the one in the couplate Z1. This is accomplished by unsoldering lead /7 of the couplate from one side of the trimmer and connecting the external 470K resistor across the trimmer terminals. This change will usually make it possible to zero beat a crystal that is too low and out of the range of adjustment provided by the trimmer.

Please remember that the low frequency response of the receiver is increased when the audio gain control is employed at the lower end of its range. This is the result of the auto response circuit. Increasing the audio gain control setting to a position past straight up and reducing the RF gain will make it possible to obtain the same volume level with less low frequency response and usually better signal-to-noise ratio. If it is desirable to reduce some of the low frequency response at the lower settings of the audio volume control, the auto response feature may be dispensed with by merely short circuiting resistor R47, 47 ohms. This results in removing the feedback which provided the better low frequency response.

Very truly yours,

THE HAMMARLUND MFG. CO., INC.
Frank I. Lester, W2AMJ
Sales Manager